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DUBBING (Decombing) PULLETS PAYS

CLETIS WILLIAMS, DONALD L. BUTLER and GEORGE F. GODFREY
Honegger Farms Co., Inc., Forrest, Illinois, U.S.A.

What is dubbing? Dubbing is generally considered to be the removal of the comb when the chick is day-old. In the past dubbing has been thought of as the removal of both comb and wattles when the bird was at least six weeks old.

When is dubbing done? The easiest time to dub pullets is when they are day-old. When properly done, there is little or no bleeding, and no injury to the chick. Dubbing can be done when a bird is older, but more labor is involved, the bird bleeds more, and the benefits of dubbing older birds are probably not worth the extra labor.

Where is dubbing done? It is usually done by the hatcheryman in the hatchery before the chicks are delivered to the customer. The standard charge for dubbing ranges from 50 cents to one dollar per one hundred chicks, or from ½ cent to one cent per chick.

How is dubbing done? A small pair of scissors (fingernail or cuticle scissors) are used to clip off the chick's comb. Very little or no bleeding occurs if the job is properly done, and there is no injury to the chick.

Why is dubbing done? The Honegger Breeder Hatchery recommends dubbing of day-old pullets because from all published reports and from our own experiments, it appears that *dubbed pullets lay from 1 to 2% more eggs than non-dubbed pullets.*

All the published information that we know of is summarized in Table 1. There are thirteen reports on fourteen trials from widely scattered geographical areas in the United States and foreign countries. Some of these reports by themselves are of little value because of small numbers of birds. But when all of these reports are considered together, they show that dubbed birds laid 1.2% more eggs than non-dubbed birds. Also note that in eleven of the fourteen trials, the dubbed birds laid more than the non-dubbed birds. A total of 5,800 non-dubbed and 5,878 dubbed birds were involved in these thirteen experiments.

Table 2 shows the results of trials conducted at the Honegger Research Farm. A total of 8,388 dubbed pullets and 12,974 non-dubbed pullets were involved in five trials. The dubbed

pullets laid 2% more eggs than the non-dubbed birds. The dubbed birds laid more eggs than the non-dubbed birds in four out of the five trials.

TABLE 1

Summary of published data concerning the effect of dubbing on egg production of White Leghorns

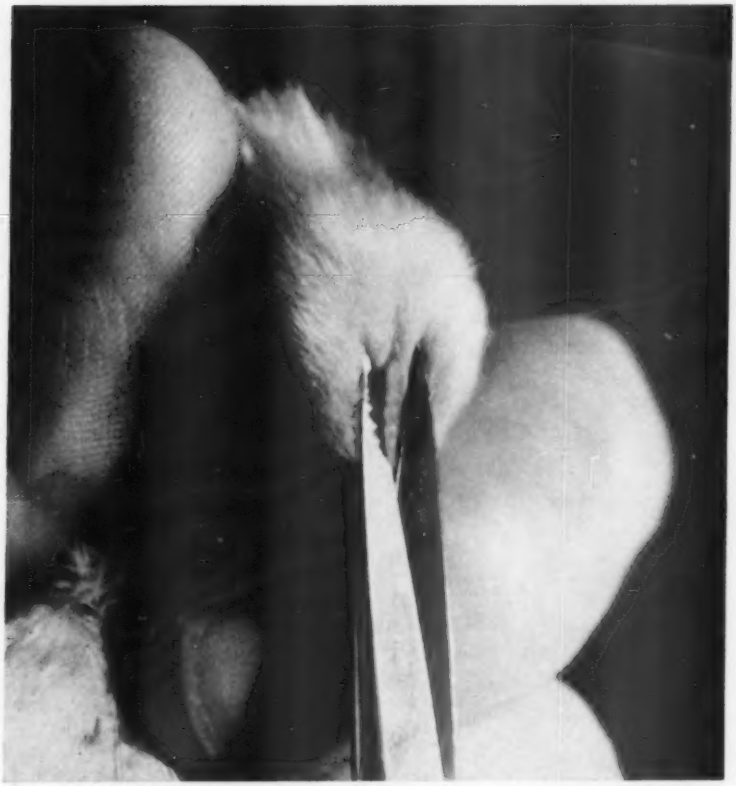
Reference	Location	No. of Birds		Age at Dubbing	Length of Test, Wks.	Egg Production		
		Dubbed	Control			Dubbed	Control	Difference %
Anonymous, 1942	Australia	60	40	4 Mo.	52	218	190	+14.7
Bice, 1942	Hawaii	100	100	1 Day	26	93	95	− 2.1
Temperton & Dudley, 1944	England	88	74	16 Wks.	40	93	76	+22.4
Temperton & Dudley, 1946	England	55	51	16 Wks.	56	151	144	+ 4.9
Jones & Kohlmeyer, 1949	S. Dakota	91	91	Abt. 5 Mos.	45½	184	196	− 6.5
Jones & Kohlmeyer, 1950	S. Dakota	—	—	Abt. 5 Mos.	51	225	219	+ 2.7
Davis et al, 1953	Wyoming	50	50	12 Wks.	52	129	107	+20.6
Davis et al, 1953	Wyoming	50	50	10 Wks.	52	181	151	+19.9
Cole & Hutt, 1954	New York	2,717	2,768	8 Wks.	About 63	185	182	+ 1.6
Lamoreaux & Hutt, 1955	California	1,132	1,042	Unknown	18	86	88	− 2.0
Laurent & Carmon, 1959	Georgia	1,169	1,168	18-21 Wks.	48-52	209	200	+ 4.5
McCluskey, 1959	Oregon	196	196	Abt. 5 Mos.	About 43	203	197	+ 3.0
Marks & Siegel, 1960	Virginia	85	85	20 Wks.	52 Wks.	244	242	+ 0.8
Marks & Siegel, 1960	Virginia	85	85	20 Wks.	52 Wks.	239	238	+ 0.4
Weighted Average		5,878	5,800			169	167	+ 1.2

TABLE 2

Effect of dubbing on egg production—Honegger Research Farm

Year	No. of Birds		Age at Dubbing	Length of Test. Wks.	Egg production
	Dubbed	Control			Difference % (Dubbed-Control)
1955-56	50	50	5 Mos.	44	+ 1.3
1958-59	2,778	7,373	1 Day	75	+ 3.4
1959-60	3,303	3,183	1 Day	22	+ 1.3
1959-60	1,519	1,506	1 Day	23	— 0.4
1959-60	738	862	1 Day	24	+ 4.7
Weighted Average	8,388	12,974			+ 2.0

A Plus (+) shows the advantage for dubbed birds, a Minus (—) shows the disadvantage for dubbed birds.



Dubbing a day-old chick. Use a pair of fingernail scissors, either straight or curved depending on your preference. Clip off comb. Little or no bleeding will occur.

Does dubbing pay? An investment of ½ to 1 cent per pullet chick for a return of an extra 2 to 5 eggs (assuming 240 eggs per pullet per year) per bird, looks like one of the best investments that a poultryman can make. *On a* 1,000 *pullet basis, an investment of* $5.00 *to* $10.00 (½ to 1 cent per chick) *gets you* $60.00 *to* $120.00 (1 to 2% better egg production based on 240 eggs per bird year, or 200 to 400 dozen eggs at 30 cents per dozen). *Dubbing pays.*

Advantages and disadvantages:

1. Dubbed pullets are quieter and tamer than non-dubbed birds. A bird with its comb lopped partly or fully over one eye has a blind side; it cannot see the poultryman and is more easily frightened than a dubbed bird which can see well out

of both eyes. There is no direct experimental evidence on this point, but many field observations by poultrymen suggest this is true.

Laying pullet with a bright red, waxy comb. Note how the comb has a tendency to lop over one eye. Some believe that dubbed pullets are calmer than non-dubbed pullets because they can see well out of both eyes. Dubbed pullets do not have a "blind side."

2. Dubbed pullets do not become injured as easily as non-dubbed birds because they have less comb to catch and tear in feeder grills, waterers, wire pits and other such places. When injured or torn, the comb tends to bleed quite freely and the resulting loss of blood is often enough to throw a pullet out of production if she doesn't bleed to death. Observations support this point; there is no experimental evidence to confirm or deny it.

3. There is a lessening of social order interactions among flocks of dubbed pullets as compared to non-dubbed flocks. Guhl and Ortman, Kansas State College, have concluded that

the comb provides a means by which birds recognize one another. Therefore, a peck order, or social order, which depends on recognition of individual birds would be greatly reduced in dubbed flocks. Perhaps this explains why dubbed pullets tend to lay a bit better than non-dubbed birds, and also why dubbed flocks seem to show less variation in egg production than non-dubbed flocks.

4. Pullets lose body heat through the comb in hot weather. There is little or no information directly on this point, but it would appear that only a small amount of body heat is lost through the comb in comparison to the amount lost through the lungs, air sacs, and by drinking greatly increased amounts of water in hot weather. Following the same line of reasoning, a pullet having a comb in cold weather would be at a disadvantage.

Dubbed laying pullet. The comb, although smaller, is bright red and waxy. With a little observation and practice it is as easy to cull dubbed pullets as it is to cull non-dubbed pullets. This pullet has also been debeaked to prevent cannibalism.

5. It is difficult to cull birds on the basis of the appearance of the comb if birds are dubbed. With a slight amount of practice and observation, it is just about as easy to cull dubbed pullets as it is to cull non-dubbed pullets.

6. Dubbed pullets in cages can eat and drink easier than non-dubbed birds. There is no published data on this point, but field observations suggest that it is true.

7. Dubbed pullets lay more eggs during the cold part of the year than non-dubbed pullets. This statement appears to be true and is supported by several experimental reports.

And it is generally true that egg prices tend to be highest during the colder parts of the year.

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RESPONSE OF CHICKS TO THE FEEDING OF SUN CURED ALFALFA MEAL

H. S. TAMIMIE
College of Agriculture, University of Baghdad
Abu Ghraib, Iraq

Kohler and Graham (1951) found that the press juice of forage contained a growth promoting factor and that this factor improved the growth promoting ability of their practical ration fed to chicks. Scott, Fisher and Snyder (1953) reported that either dehydrated or sun cured alfalfa meal improved the growth rate of chicks fed purified diets containing all the known factors. Tamimie (1950) found that feeding a higher level than 20% dehydrated alfalfa meal was not tolerated by Broad Breasted Bronze Turkey poults fed practical rations up to 28 weeks of age. Vavich *et al* (1953) reported that one or more unidentified chick growth factors were found in the dehydrated alfalfa meal.

In our study, an experiment was conducted with graded levels of sun cured alfalfa meal added to practical chick diet. The basal diet was an 18% protein ration supplemented with Vitamins A, D, B_2 and B_{12}. The chicks used in this experiment were from dams which had not been fed green feed in any form from the time they were hatched.

EXPERIMENTAL PROCEDURE

One hundred and twenty day-old unsexed New Hampshire medium weight chicks were chosen from two hundred chicks at hatching time. Large and small chicks were not taken. The medium weight chicks were distributed into six lots. In each lot twenty New Hampshire chicks were distributed in a randomized block.

The experimental groups were distributed as follows:

1. Control (starter ration)
2. Control + 2.5% sun cured alfalfa meal
3. Control + 5% sun cured alfalfa meal
4. Control + 10% sun cured alfalfa meal
5. Control + 15% sun cured alfalfa meal
6. Control + 20% sun cured alfalfa meal

Freshly cut alfalfa from a single field of our College was dried in the sun. This meal was then ground and screened into powdered form.

Vitamins A, D, B_2 and B_{12} were added to the basal diet.

Vitamin A & D Mixture (600 U Vit. D, 10,000 IU Vt. A per gram) was added at a level of 1 gram per kilo of the basal diet. Vitamin B_2 was added at levels of 16 mg. per kilo of the diet. Vitamin B_{12} was added at a level of .02 mg. per kilo of the diet.

The basal diet contained the following ingredients:

TABLE I

Starter* and control rations (18% protein)

Ingredient	Percentage
ground yellow corn	15
ground barley	10
cracked wheat	10
wheat bran	15
rice polishing	10
ground broad bean	10
millet	10
powdered skim milk	5
sesame oil meal	5
bone meal	5
limestone	4.5
salt	0.5
Total	100

* Levels of sun cured alfalfa meal were added at the expense of the starter rations for each of these groups.

EXPERIMENTAL RESULTS

Feeding graded levels of sun cured alfalfa at the expense of the starter ration improved the growth rate of chicks beginning with the second week of the trial especially for the groups fed the 10% and the 5% levels (Table II). The growth rate was ascending, starting with the low level of 2.5% and reaching the optimum growth rate at the 10% level, then descending for the 15% and 20% levels of sun cured alfalfa meal.

Feed efficiency was also improved with the groups fed the sun cured alfalfa meal over the control group, this was true especially with he groups fed the 5% and the 10% levels.

DISCUSSION OF RESULTS

The addition of sun cured alfalfa meal to the practical ration improved the growth rate of chicks fed the graded levels of this meal to four weeks of age over the control group (Table II). This finding confirmed the former findings of Kohler and Graham (1951, 1952), Scott *et al* (1953) and Vavich *et al* (1953) who reported the presence of either one

TABLE II

Average weekly weight in grams, gm. feed/gm. gain at 4 weeks, and mortality rate for feeding sun cured alfalfa meal. (Twenty New Hampshire chicks per lot)

Rations	Weekly Body Weight in Grams					Gm. Feed/Gm. Gain at 4 Weeks	No. of Deaths
	0	1	2	3	4		
1. Control	55	90	125	168	190	2.61	1
2. Control + 2.5% sun cured alfalfa meal	57	92	132	181	204	2.43	1
3. Control + 5% sun cured alfalfa meal	52	98	140	187	220	2.25	0
4. Control + 10% sun cured alfalfa meal	60	102	145	190	225	2.20	0
5. Control + 15% sun cured alfalfa meal	55	100	138	188	218	2.28	2
6. Control + 20% sun cured alfalfa meal	56	94	135	184	214	2.33	2

or two unidentified growth factors found in either the dehydrated or the sun cured alfalfa meal.

It is, therefore, advisable to include a source of alfalfa meal to the practical type of ration. This addition of either the sun cured or the dehydrated alfalfa meal will not only improve growth rate to four weeks of age, but will improve the feed efficiency of the growing chicks as well.

The advisable levels of sun cured alfalfa meal for the practical type of ration is either a 5% or a 10% level.

SUMMMARY

1. Sun cured alfalfa meal improved the growth rate of chicks to four weeks of age over the control group. This growth improvement began with the second week of the trial.

2. Growth improvement by the feeding of sun cured alfalfa meal was ascending starting with the low level of 2.5% and reaching the optimum growth rate at 10% level, then descending for the 15% and 20% levels.

3. Feed efficiency was improved with the groups fed the sun cured alfalfa meal over the control group, especially the groups fed the 5% and 10% levels.

4. The improvement in growth rate and feed efficiency for the group fed the sun cured alfalfa meal confirms the previous findings which have reported the presence of an unknown growth factor or factors in the alfalfa meal.

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DOCTOR RUPERT COLES HONORED

On Thursday the 18th May in London, England, Dr. Rupert Coles of the British Ministry of Agriculture received the Award of Honorary Professor in the National University of Mexico. The Award was presented by his Excellency Senor Armendaris, the Mexican Ambassador to the British Isles.

The award of this academic honor follows the last World's Poultry Congress which was held in Mexico City in 1958 and on which occasion Dr. Coles was President of the World's Poultry Science Association. This is the third occasion that this award has been made—the second within the last 25 years. The World's Poultry Science Association has thus been doubly honored with this Award to its Honorary Past President, Dr. Coles.

AUSTRALIAN BRANCH ACTIVITIES

On the 18th of May, 1961, there were 408 Australian members of The World's Poultry Science Association. The Australian Branch is subdivided into four active Sub-Branches in Queensland, New South Wales, Victoria and South Australia. Two more Sub-Branches are being established in Tam-

worth area (N.S.W.) and in Western Australia. An objective of 500 active members is anticipated by Congress time.

Each Sub-Branch has regular meetings with interesting and instructive programmes. These programmes consist of addresses by leading Poultry Scientists, Symposiums, Short Courses, Poultry Science Conventions and Field Days. Some Branches hold annual social events such as Chicken Barbecues.

BRANCHES ARE ACTIVE IN CONGRESS PREPARATIONS

All of the Sub-Branches are active in preparing to make make the XII World's Poultry Congress a success. Each Sub-Branch is busy establishing Congress Liason Committees and listing various hospitalities its members will offer visitors to the Congress. This is planned as a highlight for the Congress. Already week-end accommodation, sight-seeing, visits to places of interest and other entertainment before, during and after the Congress, have been offered by many of the members. The Congress Executive Committee is co-ordinating these and official information on them will be available later.

JAPAN COMMITTEE FOR XIITH WORLD'S POULTRY CONGRESS

The 8th Annual General Meeting of the Japan Branch of the World's Poultry Science Association was held at International House, Tokyo, on April 12, 1961, with the attendance of about 200.

In the annual report, it was announced that the Department of Agriculture and Forestry of Japanese Government became the patron of the World's Poultry Science Association.

Two important subjects were discussed and decided. One is the organization of the Executive Committee for the participation in the XIIth World's Poultry Congress. The following Executive Committee was appointed.

Chairman: K. Sasaki
Secretary: H. Morimoto
Sub-committee
Exhibits: F. Imamura and 6 others
Publicity: T. Yamaguchi and 6 others
General Affairs & Finance: M. Kuhara and 5 others
Membership: M. Saito and 6 others
Scientific Papers: H. Kawashima and 7 others
Travel: K. Yamanaka and 3 others

Another subject approved is the application for organization of XIIIth World's Poultry Congress in Tokyo in 1966. It was decided to organize the executive committee for the preparation and to ask the Japanese Government and other organizations who may have interest in the XIIIth World's Poultry Congress to help toward the realization of this plan.

Twenty scientific papers on nutrition, physiology, poultry husbandry and egg quality were presented in the meeting and Dr. Kruger who was invited by the Branch talked about the poultry industry in West Germany.

Next meeting will be held in this fall somewhere in Kyushu Island.

FOURTEENTH REPORT OF THE UNITED KINGDOM BRANCH

It is a source of great pleasure to me to report, for the fourteenth successive year, an increase in our membership, the more so, as the increase last year was the second largest in the history of our Branch. At 31st December, we had 643 fully-paid members, an increase of 125 over the previous year's total. New members to the number of 160 were enrolled. Against that we lost 35, 8 by death, 12 by resignation, 1 went overseas and 14 forfeited membership under Rule 6. The dis-

tribution of members was as follows:—England 544, Scotland 52, Northern Ireland 30 and Wales 17.

There were only three entries for our annual Essay Competition, two from the National Institute of Poultry Husbandry, and one from the West of Scotland Agricultural College. The winner was Miss P. C. J. Curlender from the latter institution who took the prize of £10.10. Od. and free membership for one year of the World's Poultry Science Association and its United Kingdom Branch. The subject of the essay was:—"Thoughts on the Future Expansion of the Turkey Industry" Our thanks are due to Messrs. R. Feltwell, W. J. Lintin and Bernard Matthews, who kindly acted as Scrutineers.

Your Executive Committee are concerned at the small number of entrants coming forward for the Competition. The figures of entries since its inception are as follows:—1954 (6), 1955 (6), 1956 (5), 1957 5), 1958 (5), 1959 (7), 1960 (3). Consideration was given to a suggestion that, in view of the small entry in 1960, the Competition should be discontinued. It was, however, decided to hold it in 1961, and that the position should be reviewed thereafter. The subject for that Competition, entries for which are to be received not later than 31st May 1961, is:—"Changes I would like to see in the curriculum of the course for the National Diploma in Poultry Husbandry."

Since the inception of the Branch, Mr. John R. Harvey has very kindly acted as Honorary Auditor of its accounts. Your Executive Committee, wishfull to show their appreciation of Mr. Harvey's splendid and continuous services, decided to confer upon him Life Membership of the Association and the Branch. A similar honour was conferred on your Secretary-Tresaurer.

In the previous year's Report, reference was made to the formation of the European Federation of the World's Poultry Science Association, one of whose objects is to arrange for the organization of Regional Conferences in Europe in between World's Poultry Congresses. The Federation was officially inaugurated in Utrecht on the occasion of the holding of the First European Regional Poultry Conference (15th to 18th November 1960) which was sponsored and organized by the Netherlands Branch of the Association. Ninety-seven

members of the Branch attended the Conference. The first meeting of the Executive Committee of the Federation was held at the same time when Dr. R. Coles and your Secretary were appointed President and Secretary respectively. At that meeting it was suggested that the Federation should attempt to do other work than merely organizing Conferences. One subject which was suggested might be considered was the evaluation of foodstuffs by experts from among the members of the Branches. Reference was made to the varying standards adopted in evaluating feeding-stuffs in several countries. Other suggestions included some form of evaluating the results of different breeding methods, employing the various tests and other sources of information in Europe and elsehere.

Our finances are in a very satisfactory state. In view of our membership of the European Federation of Branches of the World's Poultry Science Association fairly heavy calls will be made on our funds to meet the travelling expenses of our representative in attending meetings of the Federation's Executive Committee and for our share, approximately 50 per cent., of the administrative expenses of the Federation.

The usual routine business of the Branch was dealt with by your Executive Committee at two meetings which were held during the year. Dr. W. Bolton was elected Chairman, and in terms of Rule 4 became Vice-President.

You have been advised of the holding of the 12th World's Poultry Congress in Australia from the 10th to 18th August 1962, the Golden Jubilee of the Association. It is hoped that, despite the distance and the consequential heavy travel expense, there will be a representative attendance from the United Kingdom. You have also been advised of the Rules governing the submission of Papers at the Congress. Again it is hoped that a fairly large number of Papers of a varied and substantial nature will be sent from the United Kingdom.

Two Conferences were held during the year, one on the occasion of our Annual General Meeting, and the other at the National Poultry Show at Olympia. At the former the following Papers were presented:—

"The Feeding of High Fibre Rations to Replacement Pullets" (Dr. W. P. Blount, Ph.D., F.R.C.V.S., N.F.P.H., Director, British Oil & Cake Mills, Ltd., 2, Kingscote Street, London, E.C. 4.)

"The Use of B-APO-2 Carotenal as a dietary source of Egg yolk pigment" (Mr. J. Cook, B.Sc., Dip. Poultry Husbandry (Reading) National Institute of Poultry Husbandry, Newport, Shropshire.)

"Proposed Methods for measuring the 'Calcium-Metabolising Ability' of Laying Hens" (Dr. T. G. Taylor, M.A., Ph.D., and Mr. Hertelendy, Dip.Agric. Sci. (Budapest), Department of Physiological Chemistry, The University, Reading, Berkshire.)

"Some Coments on the results to date from the Official Progny Testing Stations" (Mr. M. C. Morgan, N.D.P., Director, Wheaton Aston Poultry Progeny Testing Station, Church Eaton, Stafford.)

"A genetic lethal in broad breasted bronze turkeys" (Mr. R. M. How of M.D. How & Son, Woodlands Farm, Chesham, Bucks.)

"The effect of feeding eggs on the growth rate of chicks and the development of tumors" (Dr. W. Bolton, D.Sc., F.R.I.C, F.R.S.E., (Agrcultural Research Council) and Dr. J. G. Carr, D.Sc., F.R.S.E., (British Empire Cancer Campaign Unit), Poultry Research Centre, King's Buildings, West Mains Road, Edinburgh, 9.)

"Some Observations on the specific gravity of eggs" (Professor C. Tyler, B.Sc., Ph.D., F.R.I.C., Dept. of Physiological Chemistry, The University, Reading, Berkshire.)

"The ventilation of Windowless Batery Houses" (Mr. D. W. Low, Grossmith Poultry Equipment Ltd., London Road, Aston Clinton, Aylesbury, Bucks.)

At the latter, two Papers on Commercial Compounding versus Home Mixing in the Economics of Poultry Nutrition were presented. Dr. Blount took up the cudgels for Commercial Compounding, and Mr. I. W. Rhys for Home Mixing. They were supported by Mr. Cyril Thornber and Mr. R. M. How respectively. Both Conferences were well attended, particularly the latter. The contributions of the speakers at both Conferences were very much enjoyed and appreciated.

Your appreciation and thanks were conveyed to the Principal of the Royal Veterinary College for his continued kindness in granting us, free of charge, the use of their Hall and canteen on the occasion of our Annual General Meeting

and Conference, and also the Bursar and Secretary and his staff for their willing help and co-operation in making our meetings so comfortable and enjoyable.

Ian MacDougall

BOOK REVIEWS

FUNDAMENTALS OF NUTRITION by E. W. Crampton and L. E. Lloyd, 1959. Published by W. H. Freeman and Company of San Francisco and London. 494 pages.

There has long been a need for a book in the field of animal nutrition that introduces the student to the principles of nutrition without emphasis upon a particular species or group of animals. E. W. Crampton and L. E. Lloyd have to a large degree accomplished this in their book entitled Fundamentals of Nutrition. Pubished by W. H. Freeman and Company, the book is somewhat unique in its organization. After an introductory section in which the animal body and its foods are described, the role energy-yielding nutrients in the operation of the metabolic machinery of the body is examined. This discussion is followed by a section on the nature of vitamins and their role in metabolism. Nutritionally important mineral elements are the subject of the fourth section. The fifth section deals with quantitative aspects of nutrition and the sixth and final section discusses the nutrient needs of animals.

The authors utilize statistics in the quantitative description of the animals and animal characteristics and elaborate upon the use of statistical treatment of data from animals used as tools in nutrition experimentation. Quantitative aspects of nutrition are dealt with in chapters on digestibility, energy values and nutritional balances.

While the book gives a good understanding of the fundamentals of nutrition, it is not a reference text and little attempt has been made to document its contents. It would appear that the book would be useful as an undergraduate textbook in a course introducing the student to the science of nutrition.

E. C. NABER

POULTRY SCIENCE AND PRACTICE By A. R. Winter and E. M Funk. Published by J. B. Lippincott Company, Fifth Edition, 1960, 550 pages.

When reading this book my sympathy went out to the authors in their monumental task of summarising current knowledge in the ever widening field of poultry science and practice. They rightly state in the preface that books have been written on each of subjects covered and it becomes very questionable whether it is now possible to cover adequately this dynamically developing industry in one moderate sized book. Since the purpose of the book is to summarise and provide samples of current information for college students in poultry science and people in other fields who need a general knowledge of the poultry industry, it seems that the stage has now been reached for more specialisation.

There has, for instance, in recent years been very considerable developments in the fields of housing, management and the control of environment, and the strong trend towards larger and more efficient units has proceeded rapidly in all countries where poultry production is prominent. I would recommend the authors to consider seriously the extension of the chapters with these fields, at the expense of the chapters dealing with Anatomy, Physiology, Nutrition and Diseases. It seems almost certain that students would require a fuller course in these latter fields, for which they would consult the many specialised books, and the practicing poultrymen will utilise compound feeds and seek specialist advice on disease problems. The science of poultry practice is now big enough in its own right to deserve specialised treatment.

The reviewer's task is to point out the good features of a book and to make suggestions for future improvement, and perhaps this is best done by consideration of chapter by chapter. Chapter 1, which summarises the poultry industry, is strongly based on American figures. Since so many English spoken countries use American poultry text books it would be helpful to give more world production and consumption trends and the relationships of home production and consumption in the various countries.

The chapter on breeds is very faithfully dealt with but the references might include "British Poultry Standards", a valuable companion to the American Standard of Perfection. In view of the great advance of knowledege, breeding for

egg production, egg size and egg quality is very well summarised. The chapter is somewhat marred by obviously old photographs of blood testing for pullorum, wing banding and culling. Surely the "five finger exercises" in culling layers have no place in a modern industry where culling of highly productive strains is uneconomic except when based on individual performance records as obtained in cages. A somewhat fuller treatment of poultry genetics, with some reference to populations and a better table of dominant and recessive characters or traits would be helpful to the student. Despite the growth of large breeding organisations, there are still many "smaller" breeders who seek knowledge of poultry genetics.

The chapters on incubation and rearing are excellent but would again be improved by better photographs, particularly of modern large scale enterprises. Perhaps the quality of some of the photographs would be improved by printing on somewhat better paper. Confinement or indoor rearing and its relationship to environment control would also merit fuller treatment in future editions as more knowledge becomes available.

The chapter on housing is well illustrated with plans and gives good guidance on the important subject of insulation. The translation of principles into practice is so very diverse in this field that it is difficult to give a complete summary and the authors have made excellent use of some good diagrams. Some enlargement of this chapter would certainly be merited in future with more stress on fundamental environmental requirements as these become known.

In the chapter on feeding the production of manure (faeces and urine) is given as 43 pounds per hen per year. Since the water elmination by way of excrete is given at 0.37 pound per day (135 pounds per annum) the above figure is obviously incorrect. The weight of excrete produced by laying hens is often incorrectly stated in poultry text books, the true figure (weighed fresh) is nearer 200 pounds per year.

The inclusion of a chapter on diseases may perhaps be open to question, but certainly in this book this subject is very concisely covered. It is one of the best chapters with excellent descriptions and diagrams of the common diseases.

Both the chapters on the marketing of eggs and table

poultry are excellent and reflect the great advances made by the American poultry industry in the presentation and promotion of its products. There are good up to date illustrations and some excellent tables, which will be of value to students in many countries.

The chapter on poultry farm management presents some excellent tables. Particularly valuable is the one on annual poultry production, consumption and prices, through 20 years. These tables are well linked by a good connecting story and there is useful reference to contract farming, now becoming an important feature of poultry production and probably warranting fuller treatment in future.

The Appendix again presents a large number of tables which will be of great value for reference. In the tables on the composition of feeds, excellent as these are, I would like to see figures for Metabolizable and Productive Energy, since these data are now widely used in compounding rations.

This book is quite excellent as a general book for poultry students, and it is worthy of a place on the bookshelf of every poultryman. The tables alone make it a valuable source of reference. There is a very good index which, together with concise systematic treatment, makes for first class readabilty.

T. E. WHITTLE

REVIEWS OF POULTRY PUBLICATIONS

(Abstracts from Animal Breeding Abstracts and from *Nutrition Abstracts and Reviews* are reproduced by arrangement with the Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England.

Acknowledgment is also made to the Biological Abstracts University of Pennsylvania, Philadelphia 4, Pennsylvania, U.S.A. for the Abstracts taken from *Biological Abstracts.)*

GENETICS

ABPLANALP, H., V. S. ASMUNDSON, and **I. M. LERNER.** (U. California, Davis.)

EXPERIMENTAL TEST OF A SELECTION INDEX. Poultry Sci. 39(1): 151-160. 1960.—A selection index designed to give maximum gains in breast width of 12-week-old New Hampshire fryers was tested experimentally in 3 phases against direct selection for the trait. Results of Phase A were inconclusive. In Phases B and C breast selection was inferior to index selection, even though the conditions assumed for construction of the latter were not met. Direct selection for breast width resulted in delayed maturity, loss in egg production, and reduced hatchability, while performance of the index selection line remained unchanged in these respects.—Authors. (Biological Abstracts)

BAKER, C. M. A. 1960. [Minist. Agric. Fish. Food, Skipton, Yorks.]

THE GENETIC BASIS OF EGG QUALITY. *Brit. Poult. Sci.*, 1: 3-16 (B.) (French summary.) A review. (Animal Breeding Abstracts)

BELASIKOV, V. 1958. Vysokoproduktivnaja porodnaja gruppa kur.

A HIGHLY PRODUCTIVE BREED GROUP OF FOWL. *Zemled. Zivotn. Moldavii*, 1958 (6): 34. From abstract in *Referat. Z., Biol.*, 1960 (1), No. 2507.—Pullets of the Moscow Black Breed Group come into lay at 5 mths. of age, laying 51 eggs in the first quarter, egg weight averaging 59 g.; the corresponding figures for Leghorns reared under similar conditions were 27 eggs and 52 g. At 6 mths. the Moscow Black pullets had an av. body weight of 2.5 kg. and cocks averaged 3.5-4 kg. (Animal Breeding Abstracts)

BOGRE, J. Fajtatiszta es keresztezett ludak novekedesi erelye es a novekedes szakaszos jellege.

GROWTH, VIGOUR AND PERIODIC CHARACTER OF GROWTH IN PUREBRED AND CROSSBRED GEESE. *Bull. Fac. Agric. Sci.*, Godollo, 1959, 27-35. Russian and English summaries.—The study was with pure Hungarian White and Chinese Swan × Hungarian White geese. Average weight at hatching was 93 g. for both groups. Weight gain was greater in crossbreds, which weighed 4548 g. at 14 and 5033 g. at 24 weeks, compared with 3896 and 4728 g. for the purebred. At these ages feed per kg. gain was 2.98 and 5.17 kg. for crossbreds and 3.27 and 5.40 for purebred. Growth rate was greatest between 4 and 14 weeks, and was very much less from 14 to 24 weeks. (From tables and English summary.)—T. D. Bell. (Nutrition Abstracts & Reviews)

BRAY, DAVID F., STEVEN C. KING, and **VIRGIL L. ANDERSON.** (Purdue U., Agric. Expt. Sta., Lafayette, Ind.)

SEXUAL MATURITY AND THE MEASUREMENT OF EGG PRODUCTION. Poultry Sci. 39 (3): 590-601. 1960.—Data collected on a commercial poultry breeding farm (Babcock, Ithaca, N. Y.) concerning

White Leghorn domestic fowl were utilized. Both annual egg production and its component parts were studied in terms of egg numbers, percentages, and arc sin form. Data were treated in these ways with a view to determining how to handle such data with maximum efficiency. Heritabilities and gentle correlation are presented. The estimates obtained for these statistics are given for several different methods of analyses. Sexual maturity had large effects on estimates of heritability for early production when egg numbers from date of 1st egg is the measure. These effects are removed by the use of percent production. Statistical techniques were used to investigate the heterogeneity of variances. Such extreme heterogeneity exist in these data that the usual transformations were ineffective in obtaining homogeneity. Hence, the authors suggested that workers should focus their attention on experimental procedures aimed at reducing: (1) the heterogeneity of variances (2) the size of the error term itself. Only after this has been accomplished will further statistical refinements be helpful. It was suggested this could be approached through greater control over the environment of experimental populations.—D. F. Bray. (Biological Abstracts)

CARSON, J. R., B. F. BACON, and **GOEFFREY BEALL.** (U. Connecticut, Storrs.)

BREED DIFFERENCE IN THE RELATIONSHIP BETWEEN BROODINESS AND EGG PRODUCTION IN THE CHICKEN. Poultry Sci. 39 (3): 538-544. 1960.—A linear regression analysis using data for 3 years from the Storrs Egg Laying Test in which 1540 non-broody and 178 broody birds from 5 breeds were involved revealed significant breed differences in the regression of annual egg production on the number of broody periods per year. Non-significant regression coefficients of –0.3 and –4.9 eggs were obtained for the Rhode Island Red and New Hampshire breeds, respectively, while for the White Leghorn, Barred Rock and White Rock breeds, the regression coefficients were significant; –8.8, –7.0, and –6.4 eggs, respectively. Broodiness had significantly less effect on annual egg production of the Rhode Island Reds than on hens of the remaining 4 breeds. New Hampshire and Rhode Island Red broody hens laid at a rate which was 6.4 and 6.7% greater, respectively, than their non-broody pen-mates, as compared to differences of 2.5, 3.1, 3.7%, respectively, for White Leghorn, Barred Rock, and White Rock breeds. These differences between breeds in compensatory rate of lay by broody hens accounted for a large part of the breed differences in regression coefficients.—Auth. summ. (Biological Abstracts)

CHERMS, F. L. Jr. (U. Wisconsin, Madison.)

INFLUENCE OF SIRE ON THE RESPONSE TO PRE-INCUBATION WARMING OF TURKEY EGGS. Poultry Sci. 39(4): 813-817. 1960.—In 2 years of study with turkey eggs, a significant increase in hatchability was obtained to 1 hour of pre-incubation warming at 100° F. This response appeared in eggs which had been laid 9 to 15 days before setting and were treated 1 week before setting. An additional increase could not be shown when eggs of a similar age were warmed for 5 hours. No significant sire family effect on the treatment response could be demonstrated with the 12 sire families tested. Eggs from dams with a normal hatchability over 60 to 65% were adversely affected by the warming treatment. The best response was obtained from hens with extremely low normal hatchability.—F. L. Cherms. (Biological Abstracts)

CHUNG, C. S., MORTON, N. E., and **H. A. PETERS, 1960.** [Dep. Med. Genet., Univ. Wisconsin, Madison.]

SERUM ENZYMES AND GENETIC CARRIERS IN MUSCULAR DYSTROPHY. *Amer. J. hum. Genet.*, 12: 52-66.—A study was made of serum enzymes in relation to muscular dystrophy in the domestic fowl, the laboratory mouse, and man. In the case of the fowl, a comparison was made between homozygous *am/am* dystrophics, *+/am* carriers and *+/+* controls In the mouse, homozygous *dy/dy* mice were compared with heterozygous carriers and isogenic normals.

In the fowl, and probably also in man, elevation of serum enzymes was characteristic of preclinical dystrophics. There was evidence of higher aldolase and transaminase levels and increased breast width in heterozygous fowls compared with normals. In general, no appreciable functional disability was present in heterozygotes. In homozygous dystrophic birds abnormalties in serum aldolase and transaminase were usually evident shortly after hatching; hyperaldolasemia and transaminasemia were greatest after 150 days. In the case of the mouse, a small group of carriers assayed at approximately 10 wks. of age did not differ significantly from a similar group of normals in respect of plasma aldolase. In dystrophic homozygotes the aldolase level was roughly 5 times normal. (Animal Breeding Abstracts)

COOK, R. E. 1959. [North Carolina State Coll., Raleigh.]
THE GENETIC AND ENVIRONMENTAL RELATIONSHIPS BETWEEN REPRODUCTIVE TRAITS AND BODY MEASUREMENTS IN TURKEYS. *Diss. Abstr.* 20: 462. (Animal Breeding Abstracts)

CRAWFORD, R. D. 1961. (Exp. Farm, Can Dept. Agr., Charlottetown, P. E. I., Canada)
BREAST RIDGE, ASSOCIATED WITH PEA AND WALNUT COMB, AS IN AID IN IDENTIFYING COMB TYPE. *Poultry Sci.* 40 (1) 262-263.

EDWARDS, H. M., Jr., J. CLYDE DRIGGERS, ROBERTA DEAN, and **J L. CARMON.** (U. Georgia, Athens.)
STUDIES ON THE CHOLESTEROL CONTENT OF EGGS FROM VARIOUS BREEDS AND/OR STRAINS OF CHICKENS. *Poultry Sci.* 39(2): 487-489. 1960.—The object of the experiment reported was to investigate the cholesterol content of the eggs from a number of strains of chickens. Eight strains were selected as typical representatives of the chickens that are common in the U.S. at the present time. Four consecutive eggs were collected from each of 10 hens from the 8 strains of chickens. The eggs were analyzed for moisture, fat, cholestrol and I number of the fat. Strain differences significantly influenced the fat, cholesterol and I number of the fat of eggs. The dry matter content of eggs did not differ significantly among the strains tested. Significant differences were obtained for hens within a strain for dry matter, and cholesterol content of the fat of eggs.—J. C. Driggers. (Biological Abstracts)

ERASMUS, J. E. 1960. [Stellenbosch-Elsenburg Coll. Agric., Stellenbosch.]
RECIPROCAL MATINGS BETWEEN THE AUSTRALORP AND LEGHORN BREEDS OF FOWL. *S. Afr. J. agric. Sci.*, 3: 41-45. (Afrikaans and French summaries.)—Crossbred pullets from Australorp cocks and Leghorn hens were significantly slower to mature, but laid larger eggs than the pullets produced by the reciprocal mating. No significant difference was found between the matings in respect of survivors' egg production. In the second year of the experiment mortality of the pullets sired by the Leghorn cocks was significantly higher than that of the reciprocal matings.—Author's abstract. (Animal Breeding Abstracts)

FOX, S. R. C. Jennings, A. MARSDEN, and **T. R. MORRIS.** (U. Reading, England.)
AN INTERACTION BETWEEN BREED AND FEEDING TREATMENT FOR EGG PRODUCTION. *Poultry Sci.* 39(1): 235-236. 1960.—Home-Mixed mash and manufactured "high energy" pellets of a different formulation were fed to 2 breeds of pullets in laying cages from 20 weeks of age to 60 weeks. Two groups of 72 Rhode Island Red x Light Sussex laid 155.1 and 142.3 eggs per hen when fed the mash and pellets respectively However, groups of 96 small hybrids of White Leghorn type averaged 170.9 and 182.4 eggs on mash and pellets.

Interaction for breeds x foods was significant ($p < 0.01$). Both breeds ate more mash than pellets, increased more in body weight when fed mash and laid larger eggs when fed pellets. No explanation of the interaction for egg number is given, but caution is urged in the extrapolation of results of feeding trials to chickens with very different physical characteristics.—S. Fox. (Biological Abstracts)

GOTO, E., and A. W. NORDSKOG, 1959. [Dep. Poult. Husb., Iowa State Univ., Ames.]
HETEROSIS IN POULTRY. 4. ESTIMATION OF COMBINING ABILITY VARIANCE FROM DIALLEL CROSSES IN INBRED LINES IN THE FOWL. *Poult. Sci.*, 38: 1381-1388.—The purpose of the present investigation was to estimate variances of general and specific combining ability, maternal effects and reciprocal effects for inbred line crosses. The data were provided by a commercial poultry breeding farm. Percent hatch of all eggs, percent brooder house mortality, age at 50% egg production, 165-, 269- and 300-day hen-housed percent egg production, hen-day total egg production, egg weight and percent laying house mortality were studied.

Most of the sire-line and dam-line differences showed statistical significance. High general combining ability variances were estimated for age at 50% egg production and egg weight (40·1 and 30·1% resp.) in the white-egg single crosses. For 165- and 300-day hen-housed percent egg production, hen-day total egg production and egg weight in the brown-egg single crosses, estimates of 33·8, 31·3, 32·2 and 25.0%, resp., were obtained. Results indicated that general combining ability was more important than specific combining ability for all characters except possibly percent brooder house mortality, percent hatch of all eggs and percent laying house mortality.

Important maternal effects and reciprocal cross effects were estimated for percent hatch of all eggs set, and also in the case of the latter for percent laying house mortality. (For Pt. 3 see *A.B.A.*, 27, No. 1575.)—From authors' summaary. (Animal Breeding Abstracts)

GRIMES, JOHN FRANCIS.
GROWTH AND EGG PRODUCTION OF PUREBRED, CROSSBRED AND INCROSSBRED POULTRY. *Dissertation Absts.* 20(6): 1931-1934. 1959. (Biological Abstracts)

GROM, A. 1958. Prispevok k studiu otazky vplyvu kohuta na sfarbenie skrupniy vajec sliepok.
THE EFFECT OF THE COCK ON SHELL COLOUR. *Sborn. vysokej Sk. Pol'nohospod. Nitre, Zootech. Cast*, II, 1958: 181-191. (Russian and German summaries.)—When White Leghorn hens (white-shelled eggs) were crossed with cocks of the Plymouth Rock breed (brown-shelled eggs), the variation in shell colour in the cross breds was no greater than that of purebred. W. L. shells and thus cannot be attributed to the cock.—Abstract of summaries. (Animal Breeding Absracts)

GROSMAN, P. R. 1960. O promyslennom skrescivanii v kurovodstve.
COMMERCIAL CROSSING IN POULTRY BREEDING. *Latv. Lopkop. Vet. Zinat. Petniec. Inst. Raksti (Riga)*, 11: 115-121.—Examples are given of crossing Australorp ♂♂ and Leghorn ♀♀ at several farms in Latvia; in each case av. egg production was greater in the crossbreds than in either parent breed. (Animal Breeding Abstracts)

HENDERSON, E. W. 1960. [Michigan State Univ., East Lansing.]
THE INHERITANCE OF SHANK COLOR IN A JUNGLE FOWL—SILVER CORNISH CROSS. *Poult. Sci.* 39: 53-56.—Progeny from reciprocal crosses scored for shank colour showed some discrepancies from the simple 2-gene model. It was concluded that the genetic basis for skin colour determination is the same in the 2 varieties. (Animal Breed Abstracts)

HOLMAN, J. 1960. [Histol. Embryol. Inst., Vet. Fac., Brno.] Srovnani spermatogeneze kachny pekingske s vyvojem samciho zarodecneho epithelu krizencu kachny pekingske s kachnou pizmovou. COMPARISON OF SPERMATOGENESIS IN THE PEKIN DUCK AND THE DEVELOPMENT OF EMBRYONIC EPITHELIUM IN CROSSES OF PEKIN AND MUSCOVY DUCKS. *Sborn, csl. Akad. Zemed. Ved, Vet. Med.*, 5(33): 403-412. (Russian and German summaries.)—The development of germinal epithelium differed in the purebreds and in the hybrids. There was no appreciable difference in hybrids sired by the Pekin and in those sired by the Muscovy. In the hybirds normal spermatogenesis ceased with the development of primary spermatocytes; there were no sperm cells in the seminiferous tubules of the testes.—Abstract of summaries. (Animal Breeding Abstracts)

HYRE, H. M.
IMPROVING INITIAL INTERIOR EGG AND EGG SHELL QUALITY THROUGH SELECTIVE BREEDING. Bull. West Virginia Agric. Expt. Sta. 442. 3-11. Illus. 1960. (Biological Abstracts)

JAAP, R. GEORGE. (Ohio Agric. Expt. Sta. Columbus).
HERITABILITIES, GENE INTERACTION AND CORRELATIONS FOR GROWTH OF GLANDS ASSOCIATED WITH ANTIBODY FORMATION IN THE YOUNG CHICKEN. *Poultry Sci.* 39(3): 557-560. 1960.—Weight of bursa of Farbicius and spleen at hatching and at 11 days of age was about twice as variable and growth of these glands was more rapid than that of the body as a whole. At constant body weights, the genetic correlation between spleen and bursa weight was about 0.33. At 11 days of age the phenotypic correlation was low due to a negative environmental correlationof 0.26 between spleen and bursa weights. Genetic effects on the variance of both glands were high at both ages, heritibility in the broad sense ranging from .56 to 92. Weight of the bursa which is more active in antibody production during the 1st few weeks after hatching appeared to be equally affected by additive and non-additive genetic effects. The genetic effects on weight of the less active spleen appeared to be mostly additive.—R. G. Jaap. (Biological Abstracts)

JEROME, F. N. 1959. (Poult. Dep., Ontario Agric. Coll., Guelph.)
COLOR INHERITANCE IN GEESE. *Canad. J. Genet. Cytol.*, 1: 135-141.—Seven pairs of characters, each determined by allelic genes were investigated in different breeds of domestic geese. The ability to produce melanin in the plumage (colour) is dominant to the inability to produce melanin (colourless). Knob on the bill is dominant to absence of knob on bill. Neck stripe is dominant to absence of neck stripe. These 3 pairs of characters are governed by genes on the autosomes. The genes determining pattern and dilution are sex-linked. Solid pattern is dominant to spotted. The gene for dilution is dominant to non-dilution in the presence of spotted pattern, but exerts only an additive effect in the presence of the gene for solid pattern. In the remaining 2 pairs of characters, white breast patch is dominant over absence of white breast patch and grey is dominant over buff. It has not been determined whether the genes responsible are on the autosomes or the sex chromosomes.—Author's summary. (Animal Breeding Abstracts)

JEROME, F. N., G. W. FRIARS, and **L. T. WEEDEN.** (Ontario Agric., Coll., Guelph, Canada.)
HETEROSIS FOR GROWTH IN TURKEYS. *Poultry Sci.* 39(5): 1225-1226. 1960.—Five matings involving 3 strains of turkeys were arranged to produce the poults for this experiment. They were as follows: Large White males × Large White females; medium-size White males × medium-sized White females; Small White males × Small White females; Large White males × Small White females; medium-size White males × Small White females. The poults resulting from these matings were weighed at 14 weeks of age. The cross of Large

White males × Small White females produced poults which had an average weight about midway between the average weight of the parent strains. The cross of medium-size white males × Small White females produced poults heavier than the weights of either of the parent strains. F. N. Jerome. (Biological Abstracts)

JONES, J. H.
TURKEY BREEDING IN NEW ZEALAND. *N. Z. J. Agric.*, 1960, 100, 443; 445-446. (Dept. Agric., Oamaru.) Nutrition Abstracts & Reviews)

KIMBALL, E. 1960. (Exp. Farm, Clinton, Conn.)
DIFFERENTIAL PENCILED PHENOTYPES. *Poult. Sci.*, 39: 232-233. GENETIC ORIGIN OF PENCILED PATTERN. *Ibid.*: 233-234.—Relationships between stippling *(Sg)*, pencilling *(Pg)*, and autosomal barring *(Bg)* in poultry are discussed.
It is stated that "experimental observations (no data given) without exception are in accord with the view that standard penciled varities carry ([*Pg-Sg*] [*Pg-Sg*])", *Pg* and *Sg* being completely linked in the *(Pg-Sg)* relationship and acting as a heritable unit in these varities. (Animal Breeding Abstracts)

KIMBALL, E. 1961. (Clinton Exp. Farm, Clinton, Conn.)
THE NATURE OF BARRED PLUMAGE PATTERN IN GALLUS.— *Poultry Sci.* 40 (1) 254-255.

KIMBALL, E. 1961. (Clinton Exp. Farm, Clinton, Conn.)
JUVENILE SOMATIC BARRING POTENTIAL IN GALLUS.— *Poultry Sci.* 40 (1) 264.

KLOSOWICZ, W. and **J. SLOTA,** Badania nad uzytkownoscia gesi garbonosej z Lubelskiego.
STUDIES ON THE UTILITY VALUE OF HOOKED-BEAK GEESE FROM THE LUBLIN REGION. *Rocz. Nauk rol.*, 1959, 74B, 485-496. (Inst Zootech., Cracow.) Russian and English summaries.—The geese were crosses of the local breed with the Chinese goose, *Cygonopsis cygnoides*, and were later in maturing than the local breed. They could be slaughtered in autumn when 6 months old or later after the summer on pasture. Females were better for fattening than males. (From English summary.)—J. C. Rigg. (Nutritional Abstracts & Reviews)

KRZANOWSKA, H. 1959. (Agric. Res. Coun. Poult. Res. Centre, Edinburgh.)
EARLY EMBRYONAL GROWTH IN INBRED LINES OF BROWN LEGHORNS AND THEIR CROSSES. *Poult. Sci.*, 38: 1446-1455.—The aim of the experiments was to campare 2 highly inbred lines of Brown Leghorns, Dwarf (D) and Small Egg (S), and their reciprocal crosses and to find if there is any evidence of heterosis during early stages of embryonic development. The experiments were later extended to compare embryos developing in the eggs laid by inbred and crossbred hens, as it had become evident that maternal effects were operating very strongly even from the earliest stages. For this, hens belonging to the lines White, Nonmoult and Nonmoult × White (N, W. and NW), and to the Breeding and Intensity lines and their reciprocal crosses (B, I, BI and IB) were used. In the 1st group of experiments embryonic development after 24 and 48 hrs. of incubation was compared and in the 2nd group of experiments after 24 hrs. of incubation only. Detailed results are presented. It appears that the early developmental rate of chick embryos does not depend upon such characters as egg or adult body size, but is connected with some qualities of the hen, thus precluding the early manifestation of heterosis or other paternal effects. (Animal Breeding Abstracts)

LEE, R. M., NGO CHEN, C. Y. HSU, and T. S. TANG.
BREEDING OF NEW LANGSHAN CHICKEN. Chinese Jour. Animal Husbandry 5: 133-134. 1959.—From 1953 up to 1958, the breeding work of New Langshan chicken was carried on with a successful result that general conformation of the breed as well as the egg-laying capacity met well to the original breeding plan. A trial extension work of the breed in some localities in Kiangsu indicated that the new breed would be well fitted to be raised in the lower Yangtze. General characteristics of this breed from 1956-1958 were given.—Courtesy Science Abstracts of China. (Biological Abstracts)

LEPAIYE, L. K. 1958 K voprosu o povysenii ziznennosti i produktivnosti obscepoljzovatelijnyh porod kur.
INCREASING VIABILITY AND PRODUCTION OF GENERAL-PURPOSE BREEDS OF FOWL. *Trud. leningr. sel.-hoz. Inst.*, No. 14: 54-60. From abstract in *Referat. Z., Biol.*, 1960 (4), No. 16134.—At a state farm in Penzen Province, the egg production of Pervomai hens in a flock that had been closed for 10 generations was increased by 4-5% by mating with Pervomai ♂♂ from a different farm; chick mortality was reduced. Crossing with Leghorns increased hatchability, reduced chick mortality, and increased the growth rate of the chicks and their subsequent production. Eggs of a darker colour were more suitable for incubation. (Animal Breeding Abstracts)

LUTZENBERG, F., and PINGEL, H. 1960. (Inst. Geflugel- u. Pelztierz., Humboldt-Univ., Berlin.) Benutzung„ nur erbwertgeprufter" Hahne in der Herdbuchzucht durch die Anwendunk eines Hahnentestverfahrens.
THE USE OF ONLY "PROVEN" COCKS THROUGH THE APPLICATION OF A COCK TESTING PROCEDURE. *Tierzucht*, 14: 132-135.—The method of cock testing used at the Blumberg Agricultural Research Station is described. It involves the use of multiple shifts, part winter production (15th Sep. to 31st Dec.) and dam-daughter comparisons. (Animal Breeding Abstracts)

MASLIEV, I. T. 1960 Kuropatcatye leggorny.
BROWN LEGHORNS. *Pticevodstvo*, 9 (7): 16-19.—There were few Brown Leghorns in the U.S.S.R. until large numbers of eggs were imported from Australia and Czechoslovakia in 1959. They were distributed to a number of state farms by the All-Union Poultry Breeding Institute. The breed is described. Based on 150 ♂♂, the coefficient of correlation between body weight at 40 days and body weight at 90 days was 0.43; the corresponding coefficient based on 893 ♀♀ was 0.50. At 7 mths. av. body weight was 2080 and 1627 g. for ♂♂ and ♀♀ resp. The comb of 4.8% of the ♂♂ had 5 points, that of 45.2% had 6 points, 38.1% had 7 points, 4.8% had 8 points and 7.1% had 9 points. The comb fell to the right in 63.7% of the cockerels. The age at 1st egg was 5½ mths. and 6- to 7-mth. pullets laid eggs with an av. weight of 53.8 g. (40-65). (Animal Breeding Abstracts)

McCARTNEY, M. G. and V. D. CHAMBERLIN. (Ohio Agr. Exp. Sta., Dept. Poul. Sci., Wooster, Ohio)
CROSSBREEDING TURKEYS. 1. EFFECT OF MATING SYSTEM ON REPRODUCTIVE PERFORMANCE. *Poultry Sci.* 40 (1) 163-170.—9 strains of turkeys representing Bronze, Large White and Small White varieties mated over a 4-year period to produce pure strains, strain crosses, back-crosses and 3-way crosses gave the following comparisons. Reproductive performance tended to be best from matings utilizing crossbred (F_1) dams. Matings involving two strains of the same variety gave poorest production. Variety crosses averaged 10% higher in hatchability than comparable pure strains but fertility was not affected by crossing varieties. Results from diallel cross data indicated that maternal affects were more important than either general

or specific combining ability for fertility and hatchability, Sex-linked effects may be involved in fertility. It was suggested that the most effective way to improve fertility and hatchability in the turkey would be through a program of test crossing to select female lines for maternal ability to be used either as pure strains in a single cross or as F_1 crosses in a 3-way cross.—From authors summary.

McCARTNEY, M. G. and **V. D. CHAMBERLIN** 1961. (Ohio Agr. Exp. Sta., Dept. Poul. Sci., Wooster, Ohio)

CROSSBREEDING TURKEYS. 2. EFFECT OF MATING SYSTEM ON BODY WEIGHT AND CONFORMATION. *Poultry Sci.* 40 (1) 224-231.—Analysis of diallel cross data of 9 strains showed that most of the sire strain, dam strain and sire X dam interaction differences were significant. General combining ability was much more important for growth than specific combining ability. For conformation, both general and specific combining ability appeared to be important, with most of the total variance being accounted for by general combining ability. Maternal and reciprocal effects appeared to be more important for growth, especially at 4 weeks of age, than for conformation, except in the case of female breast width. There was evidence for heterosis from crossing for body weight at all ages, and for breast width at 24 weeks, especially in the strain crosses. There appeared to be sufficient differences among the strains to warrant using crosses for improvement of growth and breast width from heterosis.—From authors summary.

McDONALD, M. W. 1960. [Poult. Exp. Sta., Seven Hills, N.S.W.]

PROGENY TESTING FOR DOMINANT WHITE IN MEAT-TYPE CHICKENS. *Agric. Gaz. N.S.W.*, 71: 158-161, 164.—In Australia, white-feathered birds are favoured in the dressed poultry trade. The most popular meat-type birds for use in breeding programmes are White Rocks, Rhode Island Whites and the progeny of various Leghorn × heavy breed crosses. Methods of testing for dominant white in different genetic situations are briefly summarised and an attempt is made to suggest the number of progeny required to ensure reasonable accuracy. (Animal Breeding Abstracts)

MIHAILIN, I. A., K. S. MARSUNINA, D. M. ROMANOVSKII, and **V. K. REDIH** 1960. Pancyrevskie mjaso-jaicnye kury.

PANTSYREVSK MEAT-EGG FOWLS. *Pticevodstvo*, 10 (3): 18-21.—At the Pantsyrevsk State Farm for Poultry Breeding, Ulyanovsk Province, in 1948 over 1500 hens were used in reciprocal crosses between Leghorns and New Hampshires or Rhode Island Reds. The progeny were bred *inter se* and 2 varieties, a black and a white, were selected. In 1954, Australorp and Plymouth Rock cocks were used on the 2 varieties resp.; succeeding generations have since been mated *inter se*. Both varieties are broad breasted and have a rounded meat-egg conformation with an upright leaf comb. The one variety has black plumage which may have a white undercoat, red ear lobes and dark legs. Those with white plumage have yellowish tinges, white or red ear lobes and white legs. In recent years the av. production of the black variety has varied between 159.7 and 169.5 eggs *v.* 161.1 and 170.1 eggs for the white variety; hatchability was 78.6-87.1% of the eggs set. At 2 mths. of age cockerels average 770 g.; after fattening for 21 days they weighed 1.3 kg. There are now over 122,000 of these hens at collective and state farms. A similar breed group with an average of 151.7 eggs and cockerels averaging 1070 g. at 70-80 days was developed at the State Farm Rechitsa in Bryansk Province from Plymouth Rock hens and Jubilee cocks. (Animal Breeding Abstracts)

MORGAN, W. C., and **R. J. GREB** 1959. [Agric. Exp. Sta., South Dakota State Coll., Brookings.]

GENETIC AND EVOLUTIONARY ASPECTS OF DOUBLE OVIDUCTS IN *GALLUS*. *Poult. Sci.*, 38: 1456-1462.—In an inbred line of Rhode Island Reds more than 90% of the hens, which were randomly chosen for autopsy, had 2 oviducts [*cf. A.B.A.*, 28, No. 1643]. This

genetically transmitted trait resulted in right oviducts of varying lengths, but approx. 60% of them were more than half the length of the normal left oviducts. From an evolutionary standpoint inherited persistency of the right oviduct in *Gallus gallus* is more consistent with the expected phylogenetic pattern than is non-persistency. It is suggested that the presence of 2 oviducts represents the primitive pattern—being consistent with the primordia present in the early embryo Two possible avenues which could result in persistency are: (1) hormonal imbalance and/or (2) specific tissue regression suppressors *(i.e.* specific tissue accelerators). Each mechanism would be activated by one or more genetic precursors.—Authors' summary. (Animal Breeding Abstracts)

MOYER, S. E., and W. M. COLLINS. (U. New Hampshire, Durham.)
HERITABILITY OF INTENSITY OF YELLOW SHANK PIGMENTATION IN CROSS-BRED BROILER CHICKENS. Poultry Sci. 39 (3): 662-663. 1960.—A shank coolr score was assigned to over 2200 10-week old progeny from 32 sires mated to approximately 270 dams. Estimates of heritability were based on variance component analyses. Sire component estimates were .485 and .571; dam component estimates .304 and .281 for males and females, respectively. Sex-linked gene effects are suggested.—Auth. summ. (Biological Abstracts)

NORDSKOG, A. W., L. T. SMITH, and R. E. PHILLIPS 1959.
HETEROSIS IN POULTRY. 2. CROSSBREDS *VERSUS* TOP-CROSSBREDS. *Poult. Sci.*, 38: 1372-1380.—The main purpose of this experiment was to compare the performance of Leghorn × heavybreed crossbreds from 4 outbred Leghorn ♂ lines with topcrossbreds from 4 highly inbred Leghorn ♂ lines. The former ♂ lines were actually mildly inbred, having inbreeding coefficients ranging from 16 to 28%. The latter group had inbreeding coefficients ranging from 60 to 90%. Tests were conducted over 2 successive years using 3 ♀ tester lines in 1953 and 6 in 1954. A total of 5766 chicks and 2480 pullets were involved in the study. Data were obtained on fertility, hatchability, body weights, egg production, egg weight, mortality, broodiness and interior egg quality.

Results showed consitent superior progeny performance of the 4 outbred ♂ lines compared with the highly inbred ♂ lines in each of the 2 yrs. of the test. This was probably due to the fact that these lines were of different origins and not necessarily due to the difference in inbreeding. On the other hand, the variation among the inbred ♂ line progeny means was greater than the outbreds in 10 out of 13 performance measurements. This is taken to be experimental agreement with the theory that inbreeding tends to cause genetic divergence and hence may be a useful tool in a hybridisation programme. However, the fact that the 2 groups of ♂ lines compared were not of immediate common origin prevents this experiment from being a critical test of [the] theory.

From combined results of the study, estimates of variance components were obtained. Averaging over all 13 traits measured, the single most important source of variance was due to differences in dam tester lines (26.8%). The difference between the sire groups accounted for 18.9%, while sire line differences within groups accounted for 13.9% of the total variance among cross line means. The latter may be considered an estimate of general combining ability among these Leghorn lines. [For Pt. 1 see *A.B.A.*, 22, No. 1778.]—Authors' summary. (Animal Breeding Abstracts)

ONISHI, N., and Y. KATO.
ON THE RELATIONSHIP BETWEEN THE FIRST YEAR EGG PRODUCTION RECORD AND ITS PART-TIME RECORD IN THE DOMESTIC FOWL. [In Japanese with English summ.] Bull. Natl. Inst. Agric. Sci. Ser. G 19. 97-108. 1960.—The relationship between full and part-time records of egg production in the 1st laying year, was studied with special reference to efficiency of the latter as a selection criterion for annual egg production. The production records of spring hatched

Single Comb White Leghorn flocks which survived their first laying year in 1950-1954 at the National Institute of Agricultural Sciences were used. The part-time records for various periods of time from each calendar month to the end of arbitrary month throughout the 1st laying year are analyzed regarding their heritabilities and their correlations with the full year record. Since the flock is composed of several inbred lines and some crosses among them, the coefficient of inbreeding being about 29% in average, these estimates of heritabilities (h^2) are corrected to the random basis. In the seasonal change in h^2 of egg production in 3 or 4 consecutive months, h^2 is relatively high from November to March and low in May-July, recovering its magnitude from August. Because of above mentioned phenomena, the value of h^2 of accumulative monthly egg production from the beginning of laying increases in general until the number of months counts 4, decreasing gradually thereafter. Thus the h^2 of early 4 months is higher than those for more extended periods of time including the full year period. The values of h^2_d for varying periods, are in general higher than those of h^2_s for the respective periods, especially in winter, in this flock. This indicates that the number of eggs laid during the 1st several months can be used as reasonably reliable criteria of selection for annual egg production in such a breeding system for controlling heterosis as the reciprocal recurrent selection, as it seems that the difference in magnitude between h^2_s and h^2_d is mostly due to the heterosis concerned in this flock. The coefficient of genetic correlation (r_g) between the 1st year production and the part-time record in 3 or 4 consecutive months throughout the 1st laying year is in general high, the actual range of estimates being from about 0.65 to 1. The r_g between 1st year egg production and the accumulative monthly production from the beginning of egg laying increases its magnitude as the number of months proceeds, the value for 4 months production being over 0.7. To evaluate the relative efficiency of selection for annual egg production by using the part-time records as selection criteria, the magnitude of $r_g h$ of the part-time production is compared with that of the square root of h^2 of the full year production. The result indicates that the record of consecutive 4 months from the beginning of laying is almost as reliable as the full year record itself. In addition to above mentioned discussion, because of its shorter interval of generation, it is concluded that 4 consecutive monthly production records from the beginning of egg laying could be used more effectively than full year production for the improvement of annual egg production, even if economical comparison between the 2, such as the problem on cost or labor for trap-nesting, is out of the question.—Authors. (Biological Abstracts)

PRINSLOO, W. P. 1960.
THE POTCHEFSTROOM KOEKOEK. A NEW BROILER BREED. *Fmr's Wkly* [*Bloemfontein*], 99 (8th June): 16.—At Potchefstroom College of Agriculture [Transvaal] a new breed, the Potchefstroom Koekoek, has been developed which has given good broiler results and has been approved for registration. In growth tests it averaged 1498 g. (3.3 lb.) at 12 wks. *v.* 1353 g. for several other breeds, and its food conversion was better. The Koekoek has an av. annual egg yield of 180-190 (Union average = 140-160). The breed was begun by first crossing White Leghorns with Black Australorps and then mating some of the progeny to B.A. and some to Barred Plymouth Rocks. All birds retaining the 2-tone barred feather characteristic of the B.P.R. were kept and some of these were backcrossed to B.A.s. From this stock the breed was developed; it has about 80% B.A. blood, but has a yellow skin and lighter feather colour. It crosses well with a number of other breeds, but the B.A. is preferred for crossing. (Animal Breeding Abstracts)

RYAN, R. K. [1959.] [Dep. Anim. Husb., Univ. Sydney.]
SEASONAL AND BREED EFFECTS ON COCK BIRD FERTILITY. *Proc. 1959 Poult. Sci. Conv. Univ. Sydney.* Pp. 19-21.—Semen was

collected from 4 cockerels of each of 4 breeds 6 times per mth. during a 12-mth. period. Average number of sperm per collection for each breed was: Plymouth Rock 2×10^9, Australorp 3.9×10^9, New Hampshire 1.7×10^9, Indian Game $0.4 \times 10.^9$. A fifth Indian cock gave much higher figures, varying from 2.2 to 5.0×10^9. There was a peak production in July-Sep irrespective of breed. (Animal Breeding Abstracts)

SHOFFNER, R. N., and R. E. GRANT. (Minnesota Agric. Expt. Station, St. Paul.)

RELAXED SELECTION IN A STRAIN OF WHITE LEGHORNS. Poultry Sci. 39 (1): 63-66. 1960.—Selection was relaxed in samples drawn from a population of White Leghorns developed principally for egg production. Comparisons made for 3 generations show little, if any, decrease in performance. Performance measured included egg production, hen house viability, hatchability and 8 week body weight.—R. N. Shoffner. (Biological Abstracts)

SINDOEREDJO, SOEWADI. Peternakan itik didaerah Modjosari (Djawa timur).

DUCK-BREEDING IN THE DISTRICT OF MODJOSARI (EAST JAVA). [In Indonesian with Engish summ.] Hemera Zoa 66(9/12): 176-191. 1959.—The so-called "Indonesian Runner" breed usually begins to lay eggs at the age of 6 months. Laying continues for a period of 3 months with a laying capacity of 60-70%. Around the age of 9 months these ducks begin to molt, and during the molting period (3 months) no eggs are laid. There follows a laying season of 6 months. When conditions are favorable, the laying capacity at this time is 80-90%. After this laying season the ducks molt again, followed by a laying period of 6 months, etc. Egg production generally decreases, and when they are 4 yrs old they are sold for consumption. Yearly egg-production is 192 eggs, ranging frm 160 to 250 eggs. About 60-75% of the total egg-production is hatched. The eggs are not hatched in incubators, but by a hen or female "entok" (Cairina moschata). Day-old chickens are transported and sold to other districts. Females are 10 times as expensive as males. Experienced duck-breeders are able to sex the ducklings. Age is usually determined from body size and conformation and coloring and growth of feathers. The economic aspects of duck-breeding in the Modjosari district are reviewed.—MDS. (Biological Abstracts)

SWART, L. G.

SUSSEX-RHODE ISLAND RED CROSS PRODUCES GOOD BROILERS. *Farming in S. Africa*, 1960, 36, No. 1, 49-51. [Stellenbosch-Elsenburg Coll. Agric.]—In a trial with Light Sussex × Rhode Island Red, New Hampshire and White Leghorn × Black Australorp chickens, 120 of each breed and each sex, the first named grew quickest, with cocks reaching marketable weight of about 5 lb in 14 weeks. Feed per lb. gain was from 2.12 lb. at 5 weeks to 3.76 at the end, which was less than for either of the other breeds. Cocks of each breed grew faster and more efficiently than hens. The feeds used were commercial ones, a battery mash up to 8½ weeks of age, followed by a laying mash.—T. D. Bell. (Nutrition Abstracts & Reviews)

TARAN, M., E. MOSES, and I. GABRIEL [? 1960.] [Poult. Improvement Branch, Minist. Agric., Tel Aviv.]

THE INHERITANCE OF INFERTILITY IN POULTRY. *Proc. Israel Soc. appl. Anim. Genet.*, 2nd Ann. Meet., 1959: 37-46. (Hebrew with English summary.)—An experiment on fertility of White Leghorn hens was carried out in a 2-yr. project in Ramot Hashavim. In the 1955-56 season diallel matings were carried out between 2 groups of cockerels and 4 randomly chosen groups of hens. The ♂ and ♀ parents of 1 group of cockerels ("F") were characterised by high fertility (72.9% and 96.4% resp), while the ♂ and ♀ parents of the other group of cokerels ("L") were characterised by low fertility (49.1% and 38.7% resp.). The summarised results of matings in the 1st season, gave an

average of 9.7% infertile eggs among the F cockerels, and 9.8% among the L cockerels.

The chicks resulting from the diallel matings were raised at 2 farms. In the 1956-57 season the following series of matings were carried out, the percentage infertile eggs being in brackets: sons of F cokerels with daughters of F cockerels (5.9%); sons of F cockerels with daughters of L cockerels (8.0%); sons of L cockerels with daughters of F cockerels (7.0%); sons of L cockerels with daughters of L cockerels (11.0%). An analysis of the data showed that from all sources of variance the only significant one was that due to origin or mating combinations ($P = 0.01$-0.02). Differences between all other factors (farms, periods, interactions) were nonsignificant

The authors suggest that the results may be explained on the assumption of maternal effects, and conclude that there is reason to believe that fertility differences in poultry have an appreciable genetic basis.—From English summary. (Animal Breeding Abstracts)

TAYLOR, LEWIS W. (U. California, Berkeley.)
INFLUENCE OF INHERITANCE AND AGE OF HEN UPON INITIAL EGG QUALITY. IN: CONFERENCE ON EGGS AND POULTRY. U. S. Dept. Agric. Agric. Res. Serv. (Rept.) ARS- 74-12. 31. 1959. (Biological Abstracts)

TAYLOR, LEWIS W. (U. California, Berkeley.)
INFLUENCE OF INHERITANCE AND AGE OF HEN UPON INITIAL EGG QUALITY. Poultry Sci. 39(1): 144-150. 1960.—A review of effects upon characters of whole egg and its parts: egg weight and shape; shell finish, color, thickness, porosity, mottling and smoothness; thickness and pigmentation of shell membranes; physical conditions in albumen; yolk blemishes; blood and meat spot inclusions; variations in vitamin and lysozyme contents; flavor or odor.—L. W. Taylor. (Biological Abstracts)

TYLER, C., and **F. H. GEAKE.** 1958. [Dep. Agric. Chem., Univ. Reading, Berks.]
STUDIES ON EGG SHELLS. IX.—THE INFLUENCE OF INDIVIDUALITY, BREED AND SEASON ON CERTAIN CHARACTERISTICS OF EGG SHELLS FROM PULLETS. *J. Sci. Fd Agric.*, 9: 473-483.—The percentage cracked eggs, shell thickness and porosity, membrane thickness, and total shell nitrogen and its insoluble and soluble fractions were determined in a sample of eggs laid over a year by 4 White Leghorns, 4 Black Leghorns, 4 Rhode Island Reds and 4 Light Sussex. There were marked variations among hens in all the characters studied, and breed differences in all the characters except porosity were significant; no one breed gave the highest or the lowest value for all characters. (Animal Breeding Abstracts)

VAN ALBADA, M., and **A. R. KUIT** 1960. [Agric. Coll., Wageningen.] Een geslachtsgebonden verdunningsfactor voor veerkleur bij Witte Leghorns.
A SEX-LINKED DILUTING FACTOR FOR FEATHER COLOUR IN WHITE LEGHORNS. *Genen en Phaenen*, 5, 1-9. (English summary.)—Attempts to produce an autosexing Leghorn by crossing S.C. White Leghorns, suspected of carrying the gene for barring, with Brown Leghorns failed, as the W.L. strain used was found to carry the gene for sex-linked dilution, *Sd*. Experimental evidence is presented which indicates that *Sd* and the gene for barring are alleles, in which case the symbols sd^B for barring and sd^+ for solid white are recommended. The gene *Sd.* is epistatic over sd^B and genes for colour like *C*, *E* and e^+. It may be concluded that when autosomal white seems to be dominant over red, the gene *Sd* is involved Normally, autosomal "dominant" white is incompletely dominant over black and hypostatic to red

or buff, whereas the *Sd* gene is incompletely dominant over black and red or buff.—Abstract of summary. (Animal Breeding Abstracts)

WATANABE, M. 1959. [Dep. Anim. Husb., Hiroshima Univ., Fukuyama.] PARTIAL INFERTILITY OF INTERGENERIC HYBRID EGGS BETWEEN THE MUSCOVY DRAKE AND THE COMMON DUCK. *J. Fac. Fish. Anim. Husb.Hiroshima Univ.*, 2: 375-384.—Five so-called Osaka ducks of the Pekin breed were artificially inseminated with semen from a Muscovy drake. The semen was obtained by electro-ejaculation and diluted 1:10 with 0.85% physiological saline solution. The insemination techniuqe used has already been described [*see A.B.A.*, 26, No. 1651]. The total number of spermatozoa per ejaculate was very much smaller in the Muscovy drake than in Pekin drakes, and the seasons of greatest testicular activity were not identical. The fertility rate (number of fertile eggs expressed as a percentage of all eggs laid) was at its maximum on the 2nd day after insemination, *viz.*, 75% for Muscovy *v.* 80% for Pekin semen. On the 3rd day the fertility rate fell to 50% in both cases. The over-all fertility rate in the 1st wk. was 27.6% for heterologous semen *v.* 33.3% for homologous semen. The maximum duration of fertility was 7 days in each case.

The duration of incubation averaged 31 days for hybrid eggs *v.* 28 days for Pekin and 36 days for Muscovy eggs. Six hybrid ducklings (4 ♂♂, 2 ♀♀) were hatched from the 8 fertile eggs obtained from inseminations with Muscovy semen. The 5 survivors (one was accidentally killed) grew vigorously.

It is concluded from the results of the experiments that the reduced fertility of Muscovy × Pekin eggs is not due solely to mating difficulties and that it may be related, at least in part, to the smaller numbers of spermatozoa per ejaculate in the Muscovy and to the more limited breeding season of this species. (Animal Breeding Abstracts)

WESSELS, J. P. H.
LINKAGE BETWEEN THE COLUMBIAN COLOUR PATTERN AND LATE FEATHERING IN FOWLS. South African Journal of Agric. Sci. 2 : 3 : 357-361 Sept. (1959).—The progeny of Light Sussex × New Hampshire males mated with red early feathering hens, consisting of 1065 individuals were used to determine the percentage crossover between late feathering and "silver" and as manifested in the Columbian colour pattern of fowls. During two seasons crossing over percentages of 4.66 and 1.85 were observed. For various reasons the latter mentioned value is considered the more accurate estimate. The possible existence of an autosomal factor responsible for a dilution of red colour became evident.

PHYSIOLOGY

ABBOTT, URSULA K. (U. California, Davis.), and **ROBERT M. CRAIG.**
OBSERVATIONS ON HATCHING TIME IN THREE AVIAN SPECIES. Poultry Sci. 39(4): 827-830. Illus. 1960.—The eggs of Broad Breasted Bronze turkeys, Ring-necked pheasants and Japanese quail were observed throughout the hatching process and mean times of set to pip, pip to hatch, hatch to dry, and set to dry were calculuated. Species with longer developmental periods spend greater proportions of the total time in hatching. Species differences in behavior during the hatching process are discussed.—U. K. Abbott. (Biological Abstracts)

ABPLANALP, H. (U. California, Davis.), and **W. O. WILSON.**
AFTEREFFECTS OF LIGHT IN CHICKENS. Ecology 41(3): 580-583. 1960.—Representative samples of hens from 3 chicken populations were subjected to 4 combinations of 2 different sequences of artificial lighting. These consisted of a 1st treatment of 168 days followed by the 2d treatment for 70 days. The combinations were: (a) continuous darkness followed by bright light (4 foot candles), (b) dark-

ness followed by continuous dim light (0.15 foot candles), (c) intermittent lighting of 1 minute of bright light every hour followed by continuous bright light, and (d) intermittent lighting followed by continuous dim light. Hens were able to lay in darkness at a rate of 44%, while with intermittent short light stimuli production reached 53%. Intermittent ligthing lead to a drastic reduction in subsequent egg production under succeeding treatments with continuous light, regardless of the latter's intensity. Preconditioning of hens with darkness on the other hand lead to increased production under succeeding light treatment. The results suggest that intermittent lighing of hens may lead to some sort of neural overstimulation, after which continuous light regimes cannot provide the levels of hormonal activity required for normal egg production.—H. Abplanalp. (Biological Abstracts)

AJITOMI, SEIJI. (Showa Med. Sch., Tokyo, Japan.)
INFLUENCE OF SULFISOXAZOLE, SULFISOMIDINE AND IRGAFEN ON CHICK EMBRYO. (In Japanese and English summ. p. 44.) Folia Pharmacol. Japonica 55(5): 1021-1050. Illus. 1959.—Fertile White Leghorn eggs injected with sulfisoxazole, sulisomidine or Irgafen were incubated. Body weight of the chick embryos received large dose of sulfisomidine or Irgafen was markedly reduced. Further, either of 3 drugs, in large doses, induced in the embryos ankylosis of knee joint and toes, and shortened legs in the course of development. There was not much difference among the excretions of these drugs into the allantoic fluid.—Author. (Biological Abstracts)

AKESTER, A. R. (Sub-Dept. Vet. Anat., Cambridge U., England.)
COMPARATIVE ANATOMY OF THE RESPIRATORY PATHWAYS IN THE FOWL, PIGEON AND DUCK. Jour. Anat. 94(4): 487-505. 1960.—Latex casts of the respiratory system in the fowl, pigeon and duck were used to study the distribution of primary, secondary and tertiary bronchi in the lungs, their connections with air sacs and pneumatic bones, and the relationship between the air sacs and viscera in the body cavity. Each lung contains a primary bronchus, anterior and posterior groups of secondary bronchi which are connected by many tertiary-bronchial arcades, and innumerable air capillaries which radiate out from recesses in the walls of tertiary bronchi. There are 4 anterior dorsal secondary bronchi, 8 or 9 posterior dorsal secondary bronchi and 7 or 8 posterior ventral secondary bronchi. The classical "vestibule" in the primary bronchus was not found in any cast. Direct connection between the primary bronchus and the posterior thoracic air sac, in all cases, was by the second posterior ventral secondary bronchus and not by a bifurcation in the primary bronchus. It is suggested that the concept of "recurrent bronchi" in the adult lung is of doubtful value.—Author. (Biological Abstracts)

ALEKSIEV, A. 1958. Polucavane na sperma ot petli crez gumen spermosabiratel.
COLLECTING COCK SEMEN IN A RUBBER CONTAINER. *Zivotn. vet. Delo (Sofija)*, 12 (10): 28-30. From abstract in *Referat. Z., Biol.*, 1960 (3), No. 11601.—Before serving a ♀, a rubber semen collector was fixed to the cloaca of the cock so that the semen was ejaculated into it instead of into the hen. This method may be used also with turkeys, ducks and geese. (Animal Breeding Abstracts)

AMATO, SAMUEL VALENTINO.
THE ABSORPTION OF FREE AND PROTEIN-BOUND AMINO ACIDS BY THE CHICK: METHOD AND APPLICATION TO C^{14}-LYSINE. Dissertation Absts. 20(12): 4508. 1960.—Abstract (Biological Abstracts)

ANDERSON, D. L. (U. Massachusetts, Amherst.), and **J. ROBERT SMYTH, Jr.**
EFFECT OF RESERPINE ON GROWTH AND ENDOCRINE RELATIONSHIPS IN LARGE TYPE WHITE TURKEYS. *Poultry*

Sci. 39(5): 1080-1086. Illus. 1960.—The effect of continuous low level feeding of reserpine on growth, feed conversion and thyroid, adrenal and testes size and histology were evaluated in 120 large type white male turkeys from hatching to market age. Growth and feed conversion at 3 and 6 weeks were significantly ($P<0.01$) depressed at the 0.25 mg/kg level of reserpine. Increasing the dosage level at 10 weeks to 0.50 mg/kg had essentially no effect on either criterion. Growth was slightly retarded during the last 4 weeks of the trial when reserpine at 0.25 mg/kg of feed was initiated at 10 weeks to birds previously maintained on the control ration. These effects are apparently related to the increase in thyroid gland size observed as a function of drug dosage, age at drug administration and duration of feeding. Histological study of the thyroid glands from reserpine treated males showed a distinct atrophy of secretory epithelium accompanied by increased colloid storage. This condition, indicating mild hypothyroidism, may have resulted from a partial inhibition of pituitary thyrotropin secretion.—D. L. Anderson. (Biological Abstracts)

ASUNG, PRANOTO, R.

MACROSCOPICAL AND MICROSCOPICAL CHANGES PRODUCED ON THE CHORIO-ALLANTOIC MEMBRANE OF CHICK EMBRYO BY THE INOCULATION OF FELINE INFECTIOUS GASTROENTERITIS VIRUS. Hemera Zoa 66(½): 18-28. Ilus. 1959.—Thickening of the membrane with injection of blood vessels is perceptible within 12 hours after inoculation. Within 2 to 3 days, the typical lesion, a white opague spot, becomes clearly visible. In most parts of the lesion the ectoderm has disappeared due to necrosis. The ectodermal and entodermal cells still present proliferate actively and become stratified. Many of these cells can be seen in various stages of degeneration. and intranuclear inclusion bodies such as are found in cells of infected cats are also found in some of the proliferating ectodermal and entodermal cells. (Biological Abstracts)

ATKINSIN, ROBERT L., and **FRANK H. KRATZER.** (U. California, Davis.)

INFLUENCE OF CORTISONE, LIVER, L, AND DIENESTROL DIACETATE ON THE BODY AND ORGAN WEIGHT OF MALE CHICKS. Poultry Sci. 39(3): 638-645. 1960.—Studies were made to determine the effect of various treatments on the growth rate and the weight of the comb, spleen and testes of male chicken. Cortisone (7.5 mg/wk) was given intramuscularly in 3 doses of 2.5 mg. Liver L and dienestrol diacetate were added to the feed at levels of 50 mg/kg and 10 mg/kg respectively. Testosterone proprionate was given by intramuscular injections of 1 mg 3 times per week. Cortisone consistently retarded body growth and increased the size of the comb and testes, depending somewhat however upon the age of the bird and the season of the year in which the experiment were conducted. Cortisone had only a slight inhibitory effect on spleen weight. Liver L consistently increased body, spleen and testes weight. When fed in combination with injected cortisone. Liver L caused a considerable increase in comb weight. Dienesterol diacetate had no effect on body weight and caused only a slight depression of spleen weight. Dienesterol diacetate consistently decreased the weight of the comb and testes. Testosterone proprionate was able to overcome the effect of dienesterol diacetate on the comb but did not affect the weight reduction in so far as the testes were concerned.—Auth. summ. (Biological Abstracts)

AVANO, S., and **T. SIMIDZU 1958.**

THE EFFECT OF THIOURACIL ON THE EGG PRODUCTION AND MOULT OF HENS. *Tikusan- no Kenkju (Anim. Husb.)*, 12: 1387-1388. (In Japanese.) From abstract in *Referat. Z., Biol.*, 1960 (4), No. 16149.—Thiouracil was added as 0.012% of the ration of 15 White Leghorn × Plymouth Rock hens; egg production averaged 96.30 eggs *v.* 81.91 for the controls. There was no appreciable difference in body weight in the 2 groups. (Animal Breeding Abstracts)

BALDWIN, B. C., D. ROBINSON, and **R. T. WILLIAMS.** (St. Mary's Hosp. Med. Sch., London, Eng.)
STUDIES IN DETOXICATION. 82. THE FATE OF BENZOIC ACID IN SOME DOMESTIC AND OTHER BIRDS. Biochem. Jour. 76(3): 595-600. 1960.—Benzoic acid has been administered to 9 species of birds, namely the domestic fowl, turkey, goose, Muscovy duck, domestic pigeon, wood pigeon, Barbary dove, carrion crow and grey African parrot. All these species of birds excrete benzoyl glucuronide. The domestic fowl, turkey, goose and Muscovy duck also excreted L(+)-ornithuric acid but no hippuric acid. The domestic pigeon, wood pigeon and Barbary dove also excreted hippuric acid but no ornithuric acid. The carrion crow and grey African parrot did not appear to excrete hippuric acid or ornithuric acid. (carboxy-C^{14}) Benzoic acid was administered to hens and pigeons. The hens excreted about 25-30% of the dose (240 mg/kg) as glucuronide and 40-50% as ornithuric acid in 24 hr. The pigeons excreted 25-30% of the dose (200 mg/kg) as glucuronide and 60% as hippuric acid in 18.5 hr. Chicken feces contain an enzyme which decomposes L(+)-ornithuric acid via N^5-benzoylornithine. Monobenzoylornithines were not found as metabolites of benzoic acid in hens.—Authors. (Biological Abstracts)

BARBIERI, F. D. (U. Tucuman, Argentina.) Incorporation de l'adenine-C^{14} dans l'embryon de Paulet.
THE INCORPORATION OF ADENINE-C^{14} INTO CHICK EMBRYOS. Jour. Embryol. and Exptl. Morphol. 8(2): 174-181. Illus. 1960.—The incorporation of adenine-C^{14} into chick embryos developing in vitro, in Spratt's "minimum medium", has been studied. Its localization has been detected employing autoradiography on histological sections. In embryos of 4, 5, 8 and 12 somites, adenine is mainly incorporated into the neural tube according to 2 gradients: caudo-cephalal and ventro-dorsal. Somites showed a lower incorporation, and the notochord even less. The greater part of the adenine appears to be incorporated in nucleic acids and in a water soluble fraction which we presume is constituted by nucleotides.—Author. (Biological Abstracts)

BAUM, GENEVA J., and **ROLAND K. MEYER.** (U. Wisconsin, Madison.)
EFFECT OF ADRENAL STEROIDS AND DIETHYLSTILBESTEROL ON GROWTH AND FAT CONTENT OF COCKERELS. Amer. Jour. Physiol. 198(6): 1263-1266. 1960.—Graded doses of hydrocortisone, cortisone, corticosterone and diethylstilbesterol were administered to 2-week old cockerels for 7 days and the amount of fat in depots, blood and liver was determined. Hydrocortisone and corticosterone inhibited growth, increased carcass fat and blood and liver lipids. Hydrocortisone is the more potent of the two compounds. Cortisone had no effect on growth or fat content at any of the doses used. Diethylstilbesterol increased blood and liver lipids and stimulated fat deposition without inhibiting growth.—Authors. (Biological Abstracts)

BAUMAN, V. K. O fiziologiceskoj roli soedinenij kal'cija v krovi kur.
PHYSIOLOGICAL ROLE OF CALCIUM COMPOUNDS IN THE BLOOD OF HENS. *Fiziol Biohim. Pitan. sel'skohoz. zivoin., Akad. Nauk Latv. SSR, Riga,* 1959, 125-155.—Detailed studies are described of calcium metabolism in the laying hen; the main study was of serum Ca and inorganic P fractions, with examination also of bone changes, the fate of injected ^{45}Ca at different stages of the laying cycle and the effect of low-Ca diet. The main conclusions are reported here.

There is a sudden change of Ca metabolism in the 15 or 20 days immediately before the pullet begins to lay. Serum total Ca rises sharply, in the study from 10.9 to 25.8 mg per 100 ml, mainly through an increase of protein-bound Ca but also through the appearance of a new fraction of colloidal calcium phosphate which appears to be an important source of Ca for shell formation. Serum inorganic P shows a smaller rise before laying; in the non-laying bird it is almost all ultrafilterable, but with the development of the colloidal phosphate fraction about half of the total ceases to be ultrafilterable.

It appears that the shell gland takes up ultrafilterable Ca from the blood and this leads to release of Ca from the colloidal phosphate and also to mobilisation of bone Ca to maintain both serum fractions affected. The colloidal complex is thought to form a buffer to prevent a serious fall of ionised Ca. When the Ca is liberated so is the P, with a resulting rise of free inorganic P from 5.3 to 7.9 mg per 100 ml during shell formation.

Insufficient Ca intake leads to skeletal depletion, and serum Ca and P fall; the colloidal fraction almost disappears and its loss is followed by laying of thin-shelled or shell-less eggs.

Increased Ca absorption in the pullet approaching lay is thought to be related to the appearance of the colloidal phosphate fraction in serum, which may serve as an extra transport mechanism from intestine to the rapidly storing skeleton. Protein-bound Ca is not thought to act either as a ready Ca donor or a transport mechanism. It has a part in yolk protein formation and falls during that process.

In the course of a year cyclical changes were found in bone mineral reserves, closely linked with serum Ca values and the intensity of egg production. The relation of these changes to absorption of diet Ca is not clear.—D. Duncan. (Nutrition Abstracts & Reviews)

BEAUDOIN, ALLAN R. (U. Florida, Gainesville.)
TERATOGENICITY OF DISAZO DYES IN CHICK DEVELOPMENT. Anat. Rec. 137(3): 338-339. 1960.—Abstract. (Biological Abstracts)

BECKER, WALTER A. (Washington State U., Expt. Sta., Puyallup.)
THE STORAGE OF HATCHING EGGS AND THE POST-HATCHING BODY WEIGHTS OF CHICKENS. Poultry Sci. 39(3): 588-590. 1960.—In 4 experiments using large domestic chickens the 8 and nine-week body weights of chickens hatched from eggs stored for at least 2 weeks before incubation were lower than weights of chickens from eggs stored for a shorter period. —Auth. summ. (Biological Abstracts)

BEGLARJAN, N. P. 1958.
THE EFFECT ON CHICK DEVELOPMENT OF EGG ALBUMEN FROM A DIFFERENT SPECIES INJECTED INTO THE EGGS OF FOWLS. *Gitakan Ashatutjunner.* Erevani Amalsaran. 64: 183-186. (Armenian with Russian summary.) From abstract in *Referat. Z., Biol.*, 1960 (7), No. 28746.—Guinea-fowl albumen was injeected into eggs of Golden Neck, Leghorn, Australorp, and New Hampshire hens each mated with cocks of their own breed. A chick hatched from the treated egg of a Golden Neck had down similar to that of the guinea-fowl and, when adult, had plumage resembling that of Golden Necks and guinea-fowl; its conformation resembled that of the guinea-fowl, and the shape, weight and shell thickness of its eggs resembled those of guinea-fowl eggs. (Animal Breeding Abstracts)

BEILHARZ, R. G. (Poultry Expt. Sta., Seven Hills, N.S.W., Australia.)
THE ABSENCE OF SEX-REVERSED MALES AMONG PROGENY OF OESTROGEN-TREATED PULLETS. Poultry Sci. 39(4): 906-907. 1960.—The sex of the progeny of White Leghorn females mated to Australorp males may be determined after about 6 weeks of age by shank color. Of 174 chickens vent-sexed as females, the progeny of White Leghorn pullets (implanted with two 15 g hexestrol tablets each) and Australorp cockerels, none retained the white shanks of genetic males. It was concluded that estrogen treatment of dams did not produce pullet progeny that were sex-reversed genetic males. It was thought unlikely that previously reported sex-ratios of about 42% could be explained by sex-reversed genetic males among female progeny.—R. G. Beilharz. (Biological Abstracts)

BEKHTINA [BEHTINA], V. G. 1958.
THE MORPHOLOGICAL ASPECT OF FERTILIZATION IN HENS. *Arh. Anat. (Mosk.)* 35: 92-100. (English summary.) Abstract in *Ber. wiss. Biol.*, 1958, 126: 303. *(Cf. A.B.A.*, 27, No. 1085). (Animal Breeding Abstracts)

BERGUIST, H. (Goteborg U., Sweden.)
VOLUMETRIC INVESTIGATIONS ON OVERGROWTH (HYPERMORPHOSIS) IN CHICK EMBRYO BRAINS. Jour. Embryol. and Exptl. Morphol. 8(2): 69-72. 1960.—There is no increase or decrease of the volume of the hemispheres in brains with "overgrowth". The optic tectum of chick embryos showing the overgrowth phenomenon have a markedly higher number of mitoses than do those of normal embryos of corresponding stages. It is suggested that the formation of the overgrowth is fundamentally similar to the development of proliferation furrows and of neuromeric bulges.—Author. (Biological Abstracts)

BHATTACHARYA, S. P., and ASOK GHOSH. (U. Calcutta, India.)
THE ACTION OF LUTEOID ON THE UROPYGIAL GLANDS OF MALE PIGEONS. (Polish and Russian summ.) Folia Biol. 8(1/2): 89-95. 1960.—Progesterone (intramuscular injections, 0.5 mg daily for 30 days) caused acinar hypertrophy and increased secretion.—A. Pigon. (Biological Abstracts)

BIRGE, WESLEY J. (U. Illinois, Urbana.)
REGULATORY POTENTIALITY IN THE FOREBRAIN OF THE CHICK EMBRYO. Anat. Rec. 137(4): 475-483. Illus. 1960.—In 27 chick embryos, one lateral half of the forebrain was removed at 24 to 38 hours of development. These embryos were later sacrificed at 12 to 18 days of incubation and the forebrain areas were examined to determine the effect of the imposed deficiency. No regeneration of the excised half-forebrain area occurred in any of the cases studied. Furthermore, no regulatory hyperplasia could be detected in the intact half-forebrain of such embryos. Therefore, it is concluded that the early chick forebrain lacks the potentiality to reconstitute hemilateral deficiencies through regulative development. It is also apparent from this study that the early chick forebrain differs markedly from the post-prosencephalic neural tube with respect to regenerative capacity. Certain mechanisms are discussed which may possibly account for this difference in regulatory potentiality. Subsequent to the removal of one lateral half of the early chick forebrain, the opposite, intact half-forebrain is capable of developing into an essentially normal cerebral hemisphere (together with the corresponding lateral diencephalic wall). Apparently no developmental relationships exist between the paired cerebral hemispheres which are essential to general growth and development. Also, as an intact half-forbrain is capable of closing the open medial surface resulting from the operation and since it attains normal gross morphology, it must possess some degree of form-regulatory ability. In the majority of the embryos studied, the anterior commissural tract in the intact cerebral hemisphere failed to develop normally. On this basis, it is suggested that some sort of developmental interaction normally exists between the paired cerebral hemispheres which is operative in the development of commissural tract systems.—Authors. (Biological Abstracts)

BLACKWOOD, U. B. 1961. (Dept. Poul. Husb., U. Maryland, College Park, Md.)
DEVELOPING CHICK EMBRYO LETHAL RESPONSE TO DOSE VARIATION OF 2-ETHYL-5-METHYLBENZIMIDAZOLE. *Poultry Sci.* 40(1): 3-9.— 2-ethyl-5-methylbenzimidazole (EMB) was injected into fertile eggs at varying periods of incubation. Dose response data based on dose per embryo indicated that the embryo became increasingly sensitive up to 2 days of incubation and thereafter became increasingly resistant. Dose-response data indicated that the

embryo became increasingly susceptible to the inhibitor up to 8 days, with the greatest rate during the first 2 days. The LD_{50} logarithmic curve based on "concentration" of inhibitor in embryo plus membranes differed from that in embryo alone and could not be correlated with simple membrane growth. Embryonic genetic differences were found to influence the lethality of EMB at 0 and 1½ days of incubation but not at 2 or 3 days.—From author's summary.

BROWN, W. O., and **NORMAN JACKSON.** (Queen's U., Belfast, Ireland.)
A STUDY OF THE COMPOSITION OF THE NORMAL AND HORMONE-STIMULATED OVIDUCT OF THE COMMON FOWL, WITH SPECIAL REFERENCE TO ITS AMINO ACID AND NUCLEIC ACID CONTENT. *Poultry Sci.* 39(3): 602-611. 1960.—Previous work on the composition of the oviduct of the common fowl is reviewed. The composition of the oviduct of the laying hen is examined in respect of moisture, protein, fat and ash content. The dry matter and protein content of the isthmus and magnum is higher than that of the other sections and the fat content of the funnel and uterus higher than in the other sections. Qualitative and quantitative data on the amino acid content of the protein of the oviduct are presented and the protein is shown to contain a high level of glutamic acid (22-27%). The pentosenucleic acid (PNA) and deoxypentosenucleic acid (DNA) contents of the various sections of the oviduct are presented and the whole organ shown to contain 41.6 mg/g PNA and 19.2 mg/g DNA on a dry tissue basis. The ratio PNA/DNA is much higher in the isthmus than in any other section of the oviduct. In the broody hen there is a considerable reduction in the PNA content of the oviduct and its protein content is also slightly lower while its fat content is higher. Limited data on the composition of the oviduct in birds of different ages do not show any striking differences. Data for the composition of hormone-stimulated oviducts show that when the weight of the oviduct is increased its moisture content decreases. Hormone-stimulated oviducts are similar to those of laying hens in respect of the amino acid content of their protein, but the content of protein in the tissue increases with hormone treatment.—Auth. summ. (Biological Abstracts)

BYHOVEC, A. U. 1960. Ohlazdenie utinyh i gusinyh jaic v pervye dni inkubacii.
COOLING DUCK AND GOOSE EGGS IN THE FIRST DAYS OF INCUBATION. *Pticevodstvo,* 10(4): 25-28.—Methods of cooling and incubating duck and goose eggs at the Borki Experimental Farm are described. A total of 12,734 duck eggs cooled from 37°-38° [? C.] twice daily for 25-35 mins. to 32°-33° from the 1st day of incubation had a hatchability of 73.3% of fertile eggs, or 67.4% of all eggs set *v.* 64.4% or 60.4% resp. of 14,930 duck eggs cooled from the 16th day of incubation. (Animal Breeding Abstracts)

CAMPBELL, J. G. (Poultry Res. Cent., Edinburgh, Scotland.)
FURTHER OBSERVATIONS ON THE LIVER CLEARANCE OF BROMOSULPHTHALEIN IN THE FOWL AND ITS RELATION TO OESTROGEN-ANDROGEN BALANCE. *Proc. Royal Soc. Edinburgh* 67(11): 303-317. 1959. (1960.)—Previous work has shown a sex difference dependant upon oestrogen-androgen balance, in the rate of clearance by the fowl liver of intravenously administered sodium bromosulphthalein. Further observations reported here indicate an apparent rapid fluctuation of the OE-A balance which takes place in immature chickens, both sexes showing what is interpreted as hyperoestrogenization about the age of twelve weeks. Attention is drawn to other evidence that profound metabolic and hormonal changes occur at this stage. The effect of exogenous sex-hormones on the clearance rate of BSP has been further studied, particularly the influence of extra androgen on adult males with aberrant clearances unassociated with liver lesions. More evidence for the relation between the rate of BSP clearance and the OE-Abalance is provided by the study of the effect of cessation

of ovulation on the clearance, and the effect of the development of virilizing tumours at the site of the rudimentary right ovary after left ovariectomy. Other changes which confirm hyperoestrogenization as assessed by the BSP clearance test are (a) decrease of the packed cell volume, (b) the development of a precipitable phospho-lipid in the plasma, (c) renal vascular changes, (d) adrenal cortical hyperplasia, (e) a frequent association with oviduct ligament "fibroids" and persistent cystic right oviducts.—Author. (Biological Abstracts)

CAMPOS, A. C. (U. Maryland, College Park.), **F. H. WILCOX,** and **C. S. SHAFFNER.**

THE INFLUENCE OF FAST AND SLOW RISES IN AMBIENT TEMPERATURE ON PRODUCTION TRAITS AND MORTALITY OF LAYING PULLETS. Poultry Sci. 39(1): 119-129. 1960.—Experiments were conducted with cage layers involving fast and slow rises in ambient temperature. A 24-hour exposure to 100°F using a fast rise (4°F/hr.) and a slow rise (5°F/day) in air temperature, caused: (a) a sudden, equally severe, temporary drop in egg production of Rhode Island Reds and one strain of White Leghorns, but no effect on egg production of New Hampshires and another strain of Leghorns; (b) a drop in egg weight and shell thickness, which was more pronounced under gradual than under fast rises in air temperature; (c) an appreciable increase in albumen quality of eggs laid with fast, and to a lesser extent, with slow rises in temperatures; and (d) a marked reduction in feed consumption, which was slightly greater with fast than with slow rises in temperature. The decline in egg weight, shell thickness and feed consumption, but not egg production, followed closely the rises in air temperature.—F. H. Wilcox. (Biological Abstracts)

CHERMS, F. L., JR. 1961. (Dept. Poul. Husb., U. Wisconsin, Madison)
RELATIONSHIP BETWEEN BODY WEIGHT AT THREE DIFFERENT AGES IN TURKEYS. *Poultry Sci.* 40 (1) 255-256.

CLARK, C. ELMER, and **C. S. SHAFFNER.** (U. Maryland, College Park.)

THE FERTILIZING CAPACITY OF FROZEN CHICKEN SPERM AND THE INFLUENCE OF RELATED IN VITRO PROCESSES. Poultry Sci. 39(5): 1213-1220. 1960.—Motility, methylene blue reduction time, and fertilizing ability were used to evaluate the response of fowl sperm to freezing at -79°C and to various related in vitro treatments. Glycerol was used as a protective agent for sperm during freezing with levels of 7.5% to 8.5% being optimum for protection and subsequent fertilization. Motility persisted with unfrozen sperm when up to 30% glycerol was added with phosphate buffer or Locke-Ringer solution but fertilizing capacity decreased rapidly when the level exceeded 2%. Dilution followed by contrifugation proved to be an effective means of removing excess glycerol from semen samples. This treatment was more harmful to sperm as the glycerol level was increased. An angle head centrifuge was superior to a horizontal head machine for settling the sperm. Freezing rate appeared to be of minor importance for sperm survival but there was some indication that fast freezing was superior. Up to 40% fertility was secured with semen that had been frozen and all fertile eggs hatched into apparently normal chicks.—C. S. Shaffner. (Biological Abstracts)

CLAVERT, J. Determinisme de la symetrie bilaterale chez les Oiseaux. II. Influence de la "presentation" de l'oeuf dans l'uterus sur l'orientation de l'embryon.

THE DETERMINATION OF BILATERAL SYMMETRY IN BIRDS. II. THE INFLUENCE OF THE PRESENTATION OF THE EGG IN THE UTERUS ON THE ORIENTATION OF THE EMBRYO. Arch. Anat. Micros. et Morphol. Exptl. 49(1): 1-22. Illus. 1960.—The previously reported relation between the direction of the twisting of the chalazae and the orientation of the embryo is analyzed further here.

All eggs of pigeons and most eggs of hens and ducks enter the uterus small end first. The head of the future embryo in these is directed toward the upper part of a clock-face diagram. If the large end enters first in hens or ducks, the direction of the head is reversed. In 11 cases in pigeons and 25 in hens, eggs entering the uterus small end first were mechanically turned around and these produced inversely oriented embryos similar to those occurring spontaneously. The positions of all eggs in the uterus were determined radiographically.—Hope Hibbard. (Biological Abstracts)

CROISILLE, Y. (Lab. Embriol. and Exptl., Coll. France.) Etude immunoelectrophoretique de l'apparition progressive de quelques constituants caracteristiquies de l'adulte dans le foie embryonnaire du Poulet.

IMMUNO-ELECTROPHORETIC STUDY OF THE PROGRESSIVE APPEARANCE OF SOME CONSTITUENTS CHARACTERISTIC OF THE ADULT IN THE CHICK EMBYRO LIVER. Jour. Embryol and Exptl. Morphol. 8(2): 216-225. 1960.—The immuno-electrophoretic method makes it possible to demonstrate at least 14 different constituents in extract of adult fowl liver. Of these constituents, 6 are already present in the 6½ day embryo. The others appear progressively during development. It is notable that at hatching the chemical structure of the adult is far from being realized. The identity of the embryonic and adult constituents is based on the following similarity of properties: (1) They have the same electrophoretic mobility and give a precipitation line at the same place on the migration axis; (2) they have the same diffusion coefficient in agar; (3) in double diffusion plates they give completely identical reactions.—Author. (Biological Abstracts)

CUNNINGHAM, F. E., O. J. COTTERILL, and **E. M. FUNK.** (U. Missouri, Columbia.)

THE EFFECT OF SEASON AND AGE OF BIRD. 1. ON EGG SIZE, QUALITY AND YIELD. Poultry Sci. 39(2): 289-299. 1960.—The effect of season and age of bird on size, quality and yield of eggs laid by hens of different ages was determined by observing albumen and yolk volume, egg weight, albumen height, total solids and refractive index. More than 2000 eggs were collected at biweekly intervals from August 30, 1957 to August 1, 1958. Results indicate the following: (1) Egg weight varied markedly with season, tending to be larger in spring and smaller during periods of high temperatures. (2) Total volume of albumen and yolk varied with season and age of bird. The relative amount of albumen to yolk per egg was not influenced by the seasons but as the birds advanced in age the percent of yolk per egg increased. (3) The decline in Haugh units (initial quality) was due entirely to ageing. No seasonal differences were observed. (4) Percent of total solids in albumen declined steadily with advancing age of the bird. However, the yield of albumen solids per egg tended to be higher during March and April and was greater in eggs produced by older birds. (5) The refractive indices of albumen decreased throughout the experiment. Small increases were observed in both percent of solids and refractive index during March and April. With young birds there was a very high correlation between percent of solids and refractive index of albumen, however, as the birds increased in age this correlation became less.—F. E. Cunningham. (Biological Abstracts)

CUNNINGHAM, F. E., O. J. COTTERILL, and **E. M. FUNK.** (U. Missouri, Columbia.)

THE EFFECT OF SEASON AND AGE OF BIRD. 2. ON THE CHEMICAL COMPOSITION OF EGG WHITE. Poultry Sci. 39(2): 300-308. 1960.—A study was made to determine the effects of season and age of bird on egg white content of sodium, potassium, calcium, phosphorus, chlorine, and protein and to determine if a definite relationship exists between variations of the factors studied and the variation of albumen quality as determined by Haugh units. The results indicate

the following (1) Season was highly significant in its effect on the variation of sodium, calcium and chlorine in egg white but had little or no effect on potassium, phosphorus and protein content. (2) Age of bird was highly significant in its effect on variation of phosphorus, chlorine and protein in egg white, affected the calcium content to a lesser degree, and had no effect on the sodium and potassium content. (3) None of the factors studied could be related to the original quality of the eggs except the protein content. After the birds were a year old there was good correlation between Haugh units and protein content of the albumen. F. E. Cunningham. (Biological Abstracts)

DOBRYNINA, A. Ja., I. G. KOSTIN, L. A. ZUBAREVA, A. I. SAMOLETOV, and **M. G. SALGANNIK.** 1960. (Inst. Genet., Acad. Sci. U.S.S.R., Moscow.) Vlijanie mikrodoz ionizirujuscih izlucenii na ontogenez seljskohozjaistvennyh ptic.

THE EFFECT OF MICRO-DOSES OF IONISING RADIATION ON THE GROWTH OF DOMESTIC POULTRY. *Zivotnovodstvo,* 22 (7): 61-65.—Experiments were carried out in 1957-59 at the Tomilin Poultry Farm and at the Institute of Genetics. The source of radiation was supplied by uranium or thorium, experimental eggs being given 0.001-2.9r during incubation. The hatchability of the 48,951 treated eggs was 90.4% eggs set *v.* 87.2% for 28,653 untreated controls; the corresponding percentages of fertile eggs were 93.4 and 89.9 resp. Embryonic development was greater in treated than in control groups; the latter were confined to groups of eggs incubated in different incubators from the treated eggs, as non-radiated controls in the same incubator as treated eggs evinced ionising effects. Development was greater in groups given 6 separate doses of 0.003r than in those given chronic continuous daily doses totalling 2.9r. The incubation period was not appreciably affected but the experimental chicks were better developed, grew more quickly, in general came into lay earlier, and in the first 9 mths. produced more eggs. (Animal Breeding Abstracts)

DONOVAN, G A. (Chas. Pfizer and Co., Terre Haute, Ind.), and **W. C. SHERMAN.**

ANALYSIS OF THE GROWTH PATTERN AND THE BODY COMPOSITION OF CHICKENS IMPLANTED WITH DIETHYLSTILBESTROL. Poultry Sci. 39(3): 757-765. 1960.—Experiments were conducted to determine the effect of diethylstilbestrol (stilbestrol) upon weekly gains and body composition of chickens. Weight gain of implanted birds was accelerated during the first 14 days after treatment, maximum accelration being attained by the 7th day after implanting. The rate then declined to about the same as that of controls but later leveled off while that of controls continued decreasing during the 28- to 35-day post-implantation period. Response of males was somewhat greater than that of females. The accelerated growth of treated groups during the 1st week following treatment was not accompanied by signficant changes in carcass composition. Enhanced deposition of carcass fat occurred principally during the latter 3 weeks after implantation. The data suggest that a single 12 mg stilbestrol implantation at the beginning of a five-week period brought about better weight gains than a single pellet over a two-week period and was equivalent in effect to a double pellet implantation, one initially and one 3 weeks later. Two 15 mg stilbestrol paste injections 3 weeks apart were necessary to equal the efficacy of one pellet implantation.—D. F. Chichester. (Biological Abstracts)

DUCAY, EUFEMIO D., LEO KLINE, and **STANLEY MANDELES.** (Western Reg. Res. Lab., Albany, Calif.)

FREE AMINO ACID CONTENT OF INFERTILE CHICKEN EGGS. Poultry Sci. 39(4): 831-835. 1960.—Protein-free extracts were prepared by absorption dialysis from both white and yolk of fresh, infertile eggs, and examined for free amino acids by ion-exchange and paper chromatography. At least 16 free amino acids have been found including aspartic acid, serine, threonine, glutamic acid, glycine, alanine,

proline, valine, methionine, leucine, isoleucine, tyrosine, histidine, lysine, arginine, and phenylalanine. A positive test for indole indicates the presence of tryptophane. Free cysteine, detected by nitroprusside test, is virtually absent from egg white and yolk. The total concentration of free amino acids in the yolk is approximately 40 μmoles/ml. In white, the initial concentration from 0.14 to 0.54 μmoles/ml and increases to as much as 2.3 μmoles under various conditions of storage. This rise is apparently due to the slow diffusion of amino acids from yolk to white. A much more rapid equilibration occurs when the yolk is separated from the white by a cellophane membrane.—E. D. Ducay. (Biological Abstracts)

FEENEY, ROBERT E., MARVIN B. RHODES, and **JOHN S. ANDERSON.** (U. Nebraska, Lincoln.)
THE DISTRIBUTION AND ROLE OF SIALIC ACID IN CHICKEN EGG WHITE. Jour. Biol. Chem. 235(9): 2633-2637. 1960.—Sialic acid was isolated and crystallized from chicken egg white and the principal component appeared to be identical with the sialic acid from *Escherichia coli*, which is *N*-acetylneuraminic acid. All of the sialic acid in egg white appeared to occur bound to proteins. The ovomucin and ovomucoid fractions contained approximately ¾ of the total sialic acid in the egg white. The remainder was found in the flavoprotein and the unidentified constituents. The structural components, chalazae and yolk membranes, contained approximately 10 times the concentration of sialic acid found in whole egg white, but no evidence was obtained for a major role of sialic acid in the maintenance of the physical structure.—R. E. Feeney (Biological Abstracts)

FELDMAN, G. L., and **J. R. COUCH.** (Texas Agric. Expt. Sta., College Station.)
STUDIES ON THE OXIDATIVE METABOLISM OF THE CHICK EMBRYO. I. FACTORS INFLUENCING OXYGEN UPTAKE. Poultry Sci. 39(3): 517-520. 1960.—The O_2 consumption of homogenates or cell-free extracts of 10-day chick embryos was stimulated by the addition of adenosine triphosphate (ATP) and Mg. Addition of fluoride, an ATPase inhibitor, produced an oxidation inhibition which could be overcome by further addition of magnesium. Inhibition of oxidation of Ca ion was overcome by additinal ATP. The limiting factors appeared to be ATP concentration and ATPase activity, which determined the level of phosphate acceptors in the system.—Auth. summ. (Biological Abstracts)

FELDMAN, G. L., and **J. R. COUCH.** (Texas Agric. Expt. Sta., College Station.)
STUDIES ON THE OXIDATIVE METABOLISM OF THE CHICK EMBRYO. 2. OXIDATION OF KREBS CYCLE INTERMEDIATES AND THE EFFECT OF DINITROPHENOL ON IT. Poultry Sci. 39(3): 521-523, 1960.—Additive increases in O_2 uptake by cell-free sucrose extracts from 10-day chick embryo homogenates were obtained by addition of Mg plus dinosine triphosphate (ATP) or by succinate. Alpha-ketoglutarate produced a smaller response, and required the addition of diphosphopyridine nucleotide for comparable activity. The oxidation of isocitrate by a cell-free aqueous extract proceeded slowly unless triphosphopyridine nucleotide (TPN) was added. Malate oxidation by the same extract was more rapid, and was stimulated by diphosphopyridine nucleotide (DPN). Dinitrophenol stimulated the oxidation of alpha-ketoglutarate, malate and succinate in the absence of pyridine cofactors (DPN or TPN), but inhibited oxidation in the presence of these cofactors.—Auth. summ. (Biological Abstracts)

FREDELLA, G. 1960. (1st. Zootec. Gen., Univ. Naples.) Osservazioni sul comportamento sessuale di alcuni uccelli domestici.
OBSERVATIONS ON THE SEXUAL BEHAVIOUR OF SOME DOMESTIC BIRDS. *Ann. Sper. agr.*, N.S. 14: 347-357. (English summary.)—Following a short review of earlier work, personal observations

regarding the fowl, goose, duck and Muscovy duck are described and contrasted. Sexual behaviour is similar in all these species, the ♀ taking the initiative, and the ♂ being responsible for the completion of mating. This is classified as complete, incomplete or interrupted. The last 2 types may result in failure to obtain fertilised eggs. It is considered that further studies are necessary. (Animal Breeding Abstracts)

FUJIOKA, TOSHITAKE, T. NISHIDA, and **M. YASUDA.** (Nagoya U., Japan.)
COMPARATIVE AND TOPOGRAPHICAL ANATOMY OF THE FOWL. IX. ON THE ORIGIN AND INSERTION OF THE MUSCLES OF THE HIND-LIMB IN THE FOWL. In: Proceedings of the 47th meeting of the Japanese Society of Veterinary Science. Japanese Jour. Vet. Sci. 21(6): 35. 1959.—Japanese abstract. (Biological Abstracts)

FUNK, E. M., and **JAMES FORWARD.** (U. Missouri, Columbia.)
THE RELATION OF ANGLE OF TURNING AND POSITION OF THE EGG TO HATCHABILITY OF CHICKEN EGGS. Poultry Sci. 39(3): 784-785. 1960.—Results secured with chicken eggs incubated in horizontal position as compared to eggs trayed small end down showed that eggs incubated small end down consistently hatched better at all angles of turning, as follows: 30° turning 73.4 vs. 70.4; 45° turning 76.7 vs. 72.5; 60° turning 75.0 vs. 70.2 and 75° turning 75.1 vs. 71.9%.—E. M. Funk. (Biological Abstracts)

FUNK, E. M., and **J. E. FORWARD.** 1960. (Missouri Agric. Exp. Sta., Columbia.)
EFFECT OF PRE-INCUBATION ON THE HATCHABILITY OF CHICKEN EGGS. *Res. Bull. Mo. agric. Exp. Sta.*, No. 695: 12 pp.—Eggs were obtained from a local hatchery and the University Poultry Farm. They were pre-incubated in a forced draft incubator at 99¼° F. and 60% relative humidity. Some of the eggs were warmed at room temp. (75°-80° F.) and others in warm water (110° F.). Eggs were set at different seasons of the year and data were also obtained on eggs held for different periods. The results are set out in 15 tables and 4 figures. In one series of experiments in the spring of 1955, pre-incubation for 3, 6 and 9 hrs. two days before eggs were set apparently increased hatchability of eggs set by 2-4%. When these tests were repeated in Dec. 1955 and Jan. 1956 to determine seasonal effects, pre-incubation appeared to have little, if any, effect in improving hatchability of eggs held 5-9 days. Pre-incubation improved hatchability of eggs held 1-5 days but not eggs held 6-10 days. Tests held during the summer showed that pre-incubation is not beneficial at this time and may even depress hatchability. Rapid warming of eggs in water in March-April was beneficial for eggs held 1-5 days but not for eggs held 6-10 days. In the summer pre-warming had no effect on eggs held 1-14 days. (Animal Breeding Abstracts)

FUNK, E. M., and **J. (E.) FORWARD.** 1960.
EFFECT OF HOLDING TEMPERATURES, ON HATCHABILITY OF CHICKEN EGGS. *Res. Bull. Mo. agric. Exp. Sta.*, No. 732: 12 pp.—In a series of experiments, broiler-type New Hampshire, White Rock and Vantress × New Hampshire eggs from a commercial hatchery were held at temperatures ranging from 50° to 90° F. and were set at from 4 to 10 days old. In all experiments best hatchability was obtained by holding eggs at 50° F.; in some cases warming the eggs at room temp. (75°-80° F.) for 1 day prior to setting improved the results. (Animal Breeding Abstracts)

GALE, C., and **K. I. BROWN.** 1961. (Depts. Vet. Sci. and Poultry Sci., Ohio Agric. Exp. Sta., Wooster.)
THE IDENTIFICATION OF BACTERIA CONTAMINATING COLLECTED SEMEN AND THE USE OF ANTIBIOTICS IN THEIR CONTROL. *Poultry Sci.* 40 (1): 50-55.—440 semen samples revealed

the presence of *Staphylococcus albus*, *Staphylococcus aureus*, coliform bacteria (predominantly *Escherichia coli*), *Proteus sp.*, *Streptococci sp.*, *Alcaligens sp.*, *Diptheroid bacilli*, and *Bacillus sp.* Over 20 consecutive weeks samples from 20 individual turkeys varied from bird to bird and from week to week with *Staphylococcus* organisms in 78% of the samples and coliform organisms in 53.5%. No bacteria were found in semen collected aseptically from the *vasa deferentia*. As would be expected sensitivity to various antibiotics varied from sample to sample. A combination of dihydrostreptomycin and penicillin or dihydrostreptomycin and oxytetracycline inhibited the bacteria present for 7 hours at 38°C. as measured by aerobic and anaerobic metabolism in the Warburg respirometer.—From authors summary.

GEISSLER, B. 1960. (Inst. Kleintierz., Karl-Marx-Univ., Leipzig.) Untersuchungen uber die kunstliche Brut zur Verbesserung der Schlupfergebnisse bei Huhnern und Wassergeflugel.

INVESTIGATIONS INTO ARTIFICIAL INCUBATION FOR THE THE IMPROVEMENT OF HATCHING RESULTS IN POULTRY AND WATERFOWL. *Tierzucht*, 14: 28-31.—A review covering the effects of heredity, parental age, sex ratio and feeding on hatching results. (Animal Breeding Abstracts)

GLICK, BRUCE. (Mississippi State U., State College.)

LEUCOCYTE COUNT VARIATION IN YOUNG CHICKS DURING AN 18-HOUR PERIOD. Jour. Appl. Physiol. 15(5): 965. 1960. (Biological Abstracts)

GLICK, B., and C. R. SADLER. 1961. (Dept. Poul. Husb., Miss. State U., State College, Miss.)

THE ELIMINATION OF THE BURSA OF FABRICIUS AND REDUCTION OF ANTIBODY PRODUCTION IN BIRDS FROM EGGS DIPPED IN HORMONE SOLUTIONS. *Poultry Sci.* 40 (1) 185-189.—Hormones were introduced into fertile eggs by dipping the eggs into solutions containing testosterone propionate and diethylstilbestrol. Testosterone significantly reduced, and in some cases, eliminated the bursa of Fabricius. The bursa was also significantly reduced after eggs were dipped in a diethylstilbestrol solution. Antibody response to polyvalent K *Salmonella pullorum* antigen was markedly reduced in birds hatched from the testosterone propionate dipped eggs. A description of the treated birds was given.—Authors summary.

GOLOVACHEV, G. D. (Acad. Sci., Leningrad, USSR.)

THE EFFECT ON FOWLS OF REGULAR EXPOSURE TO A VERY STRONG AUDITORY STIMULUS IN THE POSTNATAL PERIOD. Zhur. Vyssh. Nerv. Deiatel'nosti (Transl.) 9(4): 531-539. 1959.—Translated from Zhur. Vyssh. Nerv. Deiatel'nosti 9(4): 606-614. 1959.—Training in strength of the excitatory process for the progressively increasing sound of the rattle was successful only when the sound had alimentary signal significance (first group). When the same action was purposely left uncombined with any inborn reflex activity, no training development took place (second group). Training of the endurance of the excitation process, effected from the early postnatal period, for the progressively intensified sound of the rattle with reinforcement by the basic meals produced favorable changes in the strengths of the basic nervous processes of sufficient degree to allow the separation of the hens into an independent group with more powerful nervous processes. Exposure to the same noise of the rattle over an equally long period, but without food reinforcement, weakened the nervous systems of the hens and did not lead to development of strength of the nervous system. Training in the early stage of ontogenetic development has definite importance. Its effect on higher nervous activity was clearly evident 18 months after the termination of training.—Author. (Biological Abstracts)

GROSSE, A. E., and **J. V. CRAIG.** (Kansas Expt. Sta., Manhattan.)
SEXUAL MATURITY OF MALES REPRESENTING TWELVE STRAINS OF SIX BREEDS OF CHICKENS. Poultry Sci. 39(1): 164-172. 1960.—Males of 12 strains of chickens, representing 6 breeds, were artificially stimulated for ejaculation and were also observed in mating trials to estimate age at sexual maturity by 3 criteria. Leghorns (16.19 weeks) and heavies (15.72 weeks) were very nearly the same age at 1st sperm production. Similar results (18.44 weeks for Leghorns and 18.97 weeks for all heavies) were obtained with reference to age at 1st collection of 100,000,000 sperm in a single ejaculate. Although significant differences were generally lacking between strains of the same and different breeds for the age at 1st collection of sperm and for production of 100,000,000 sperm, these 2 traits were correlated (0.88) to a highly significant extent for strains. Under the test conditions of this experiment, significant strain and breed differences were found for age at 1st successful natural mating (mean of 27.01 weeks) which was considerably later than age at 1st sperm collection and age at 1st ejaculate with 100,000,000 sperm. The average age at 1st successful natural mating for the heavy breed strains was 4.9 weeks earlier than for the Leghorn strains. Serious limitations of the testing procedures used to estimate age at 1st natural service are discussed. Social dominance effects within pairs of males, kept together, suggest that socially-dominated males were later in sexual maturity than males socially superior to them. Age at 1st sperm production was found to be significantly correlated with age at 1st egg, but not with hen-day percentage production, for strains within breeds.—J. V. Craig. (Biological Abstracts)

GUHL, A. M. 1961. (Kansas State U., Manhattan, Kansas)
THE EFFECTS OF ACQUAINTANCE BETWEEN THE SEXES ON SEXUAL BEHAVIOR IN WHITE LEGHORNS. *Poultry Sci.* 40 (1): 10-21.—In behavior experiments cocks penned singly with a flock of hens may yield data similar to actual performance in a breeding pen, but more data may be obtained per unit of testing time if the males are caged and released singly for short periods. In the latter situation both sexes show a higher level of sex drive. The waltz, which is the most striking display by the male, is frequent when testing caged males but absent when cocks remain with acquainted females. This display has both agonistic and sexual elements. Since the rear approach is the most effective in completing the mating sequence, this measure of sex drive would appear to be more reliable than the waltz and may be used along with treading to evaluate libido.

Different methods of increasing or decreasing the acquaintance between the males and females were suggested.—From authors's discussion.

HALLER, R. W., and **F. L. CHERMS, JR.** 1961. (Dept. Poul. Husb., U. Wisconsin, Madison)
A COMPARISON OF SEVERAL TREATMENTS ON TERMINATING BROODINESS IN BROAD BREASTED BRONZE TURKEYS. *Poultry Sci.* 40 (1) 155-162.—The average number of days required to return the hens to egg production with the most effective treatments were: (1) In 1957, progesterone 20 mg. and 7 days in a wire floor pen. (2) In 1958, 24 hrs. exposure to intense light. (3) In 1959, 24 hrs. exposure to intense light and injections of 1 gm. and 2 gm. of gonadotrophin. The treatments which returned broody hens to their normal sitting patterns in the shortest time were the wire floor pen in 1957 and 1958 experiments, the light in 1958 and combination of diethylstilbestrol (12 mg.) and progesterone (10 mg.) and the mixture of diethylstilbestrol (6 mg.), progesterone (5 mg.) and DCA (5 mg.) in 1959.—From authors summary.

HAMA, TAKAO. (Osaka U., Japan.)
EFFECTS OF UBICHINONE-(50), ADENOSINE TRIPHOSPHATE, ADENYLIC ACID, CARNOSINE, AND THE ACTIVE SUBSTANCE FROM HEART ON ^{32}P-INCORPORATION INTO CHICK MYOCARDIUM (S. AONUMA: STUDIES ON HEART VII). Endo-

crinol. Japon. 7(1): 57-60. 1960.—The influences of ubichinone-(50), adenosine triphosphate (ATP), adenosine monophosphate (AMP), carnosine and the active substance of inhibiting heart function isolated by the author on P^{32}-incorporation into chick myocardium by injecting in the abdomen of male chick 2 days after hatching were investigated. Administration of ubichinone-(50), ATP, AMP, or carnosine (1 mg/chick) did not show any influence significantly, but 1 mg/chick of the active substance decreased P^{32-} incorporation significantly with P less than 0.05. Furthermore a linear regression of log dose-response curve of the active substance was recognized in the range of 2 gamma to 500 gamma/chick.—Author. (Biological Abstracts)

HAMANA, V. 1958.
A STUDY OF FERTILISATION IN THE FOWL. *Niwatori-no* Kenkyu, 33 (8): 58-60. (In Japanese.) From Abstract in *Referat. Z., Biol.*, 1960 (6), No. 26031.—In Jan.-Feb. the maximum number of fertilised eggs was laid in the 20 days after the cock was removed. In March-April it was necessary to mate the hens every 10 days for 80% of the eggs to be fertile. (Animal Breeding Abstracts)

HARPER, J. A., and **J. E. PARKER.** (Oregon State Coll., Corvallis.)
EFFECT OF RESTRICTED LIGHT AND HORMONES ON SUBSEQUENT EGG PRODUCTION OF WINTER HATCHED TURKEYS. Poultry Sci. 39(4): 900-903. 1960.—In two experiments Beltsville Small White turkey hens hatched in November and December were subjected to 9 hours daily light for 4 weeks when 25.5 or 27 weeks of age on June 1. Following the restricted light regime the hens were exposed to 17 hours of light daily. Egg production of the restricted light hens was higher during August, September and October than for similar hens maintained on natural day length to June 28 and 17 hours of light daily thereafter. This confirms previous findings at this station. When turkey hens 25.5 weeks of age were given single subcutaneous injections of progesterone at levels ranging from 5 to 40 mg there was a linear depression of egg production with increasing dosage during the following month. Steroid hormones including diethylstilbestrol, progesterone and desoxycorticosterone acetate, singly or in combination, were without effect at the levels used in overcoming refractoriness in turkey hens reared during a period with increasing daily light.—J. E. Parker. (Biological Abstracts)

HENINGER, R. W., W. S. NEWCOMER, and **ROLLIN H. THAYER.** 1960. (Depts. Physiol. Pharmacol. and Poul. Sci., Okla. State U., Stillwater)
THE EFFECT OF ELEVATED AMBIENT TEMPERATURES ON THE THYROXINE SECRETION RATE OF CHICKENS. *Poultry Sci.* 39: 1332-1337.—Three groups of two-day old chicks were given to three weeks of age at environmental temperatures of 75, 95 and 105°F. with a relative humidity of 45 percent. At the end of three weeks the thyroid secretion rate at 75°F was estimated to the equivalent of 3.6 micrograms of L-thyroxine/bird/day, or 0.63 micrograms/100 grams of body weight/day.At 95°F, the rate was estimated to be 1.60 micrograms/bird/day, or 0.34 micrograms/100 grams of bodyweight/ day, while at 105°F, 0.70 micrograms/bird/day, or 0.242 micrograms/100 grams of body weight/day, were secreted. Body weight gains at the end of three weeks showed an average increase of 300 grams for those birds raised at 75°F; 253.4 grams at 95°F; 144 grams at 105°F. Feed consumption for the same three week period showed a similar trend. At 75°F the average amount of ration consumed by each bird for the entire period was 483.5 grams; at 95°F 369.1 and at 105°F 250.2 grams. The decrease in body weight was thought to be a result of decreased appetite and consequent decreased feed consumption at the higher temperature. Evidence is presented to indicate that at the 105°F temperature, the elevated body temperature had a direct effect on the thyroid by reducing its affinity to TSH.—From authors conclusions.

HERIN, REGINALD A., NICHOLAS H. BOOTH, and **ROBERT M. JOHNSON.** (Colorado State U., Fort Collins.)

THERMOREGULATORY EFFECTS OF ABDOMINAL AIR SACS ON SPERMATOGENESIS IN DOMESTIC FOWL. Amer. Jour. Physiol. 198(6): 1343-1345. 1960.—In an attempt to determine if the posterior abdominal air sacs exert a cooling effect on the testes of the domestic rooster, thereby facilitating normal spermatogenesis, the air sacs were surgically removed and the testes insulated with surgical cotton. No significant difference was found in the semen quality between the control and experimental groups. Comparison of the testicular, air sac and rectal temperatures showed no significant differences. It is suggested that the air sacs do not cool the testes of the rooster and that the germinal epithelium of the rooster has adapted to the high body temperatures and produces normal spermatozoa at this temperature. —Authors. (Biological Abstracts)

HERTELENDY, F., and **T. G. TAYLOR.** 1961. (Dept. Physiol. Chem., Univ. Reading, England)

CHANGES IN BLOOD CALCIUM ASSOCIATED WITH EGG SHELL CALCIFICATION IN THE DOMESTIC FOWL. 1. CHANGES IN THE TOTAL CALCIUM. *Poultry Sci.* 40 (1) 108-114.—The total plasma calcium of White Leghorn pullets was determined on 37 individual birds at two stages of the laying cycle, shortly after oviposition and during the calcification of the subsequent egg. The experimental birds were hybrids between two highly in-bred lines of White Lghorns, and the blood values were studied while the pullets were on a normal (2%) and a low (less than 1%) calcium diet. On the normal Ca diet a highly significant fall in total plasma calcium was observed during shell calcification. When the birds laid 2 eggs on the low Ca diet during a 48 hour period, there was a progressive fall in blood calcium and a progressive thinning of the egg shells. When the deficient diet was fed only for 24 hours the majority of the experimental birds showed a small but significant rise in blood calcium after oviposition compared with the level during shell formation.—Authors summary.

HOMMA, KAZUTAKA, and **KOZO TUCHIDA.** (Nagoya U., Anzyo, Japan.)

NaCl-ACETATE TURBIDITY TEST. A SIMPLE METHOD FOR THE ESTIMATION OF EGG YOLK-LIKE PROTEINS IN THE PLASMA OF LAYING HENS AND OF ESTROGEN-TREATED ROOSTERS. Poultry Sci. 38(6): 1426-1430. 1959.—The AC-turbidity test was devised as an improved method of the W-test reported in the previous paper. The N:P ratio (wt:wt) of the precipitate was the same at a certain turbidity level, regardless of the source of the plasma either taken from laying hens or from estrogen-treated roosters. Rate of egg laying was proportional to the Ac-turbidity in good layers; in poor layers the rate of laying appears to be restricted by factors other than concentration of yolk precursors in the plasma. Severe molting usually accompanied a sudden drop in the Ac-turbidity. The good layers showed a relatively stable Ac-turbidity level of about 150 during the laying period. (Biological Abstracts)

HUNSAKER, W. G., and **J. B. AITKEN.** (Central Exptl. Farm, Ottawa, Canada.)

THE EFFECT OF "VISIBLE" LIGHT ON THE FERTILIZING CAPACITY OF FOWL SPERMATOZOA. Poultry Sci. 39(4): 865-867. 1960.—Exposure of fowl spermatozoa to an intense beam of "visible" light for 2 hours had no detrimental effect on their fertilizing capacity. While the results in fact suggested a slight improvement in fertilizing capacity; the differences between treatments were not statistically significant. The hatchability of fertile eggs was not affected by the light treatments.—W. G. Hunsaker. (Biological Abstracts)

INCE, J. H., and **W. P. JAFFE.** 1961. (Distillers Co. Ltd., Great Burgh, Epsom, Surrey, and School Vet. Sci., U. Bristol, Langford, Bristol)

VARIABILITY IN THE GROWTH RESPONSE OF CHICKS. *Poultry Sci.* 40 (1): 67-73.—Variation in response of replicate groups to a given food additive stems from variation between chicks in the same group and variation between groups. Although there is a marked correlation between initial and 4-week weights for chicks in the same pen, this does not apply to replicate pen means, and consequently the use of initial weights in adjusting weights for later weeks, either by covariance analysis or by considering weight increases, has little effect on precision. Adjustment to a common food intake, however, gives a slight improvement in precision. Groups of 4 birds give the same growth and consume the same amount of food per bird as larger groups, although groups of 2, and single birds, give markedly different results. The variation within pens of 4 birds per group is appreciably smaller than groups of 12 or more and groups of 4 show an increase in efficiency over previous trials with groups of 25 birds.—From authors summary.

JAFFE, P. 1960. (Sch. Vet. Sci., Univ. Bristol.)
DIFFERENCES IN NUMBERS OF ERYTHROCYTES BETWEEN INBRED LINES OF CHICKENS. *Nature (Lond.)*, 186: 978-979.—A study was made of the red cell characteristics of adult ♀♀ belonging to the Reaseheath inbred White Leghorn strains *C*, *I* and *W*. Compared with the other strains, birds of the *C* line were characterized by an apparent reduction in the number of circulating red blood cells. However, no cytological signs of anaemia were present. In mature body weight the *C* line was intermediate between the other 2 lines, but it was greatly superior to both in egg production. No haemoglobin abnormalities were detected, but the resistance of the erythrocytes to osmotic pressure was lower than in the W line, as judged by the occurrence of haemolysis at higher concentrations of saline. The mode of inheritance of the condition is being investigated. (Animal Breeding Abstracts)

JEFFRIES, C. D. (U. Tennessee, Knoxville.), **D. F. HOLTMAN,** and **J. A. CAMERON.**
CHANGES IN THE INFRARED SPECTRUM OF THE LIVER LIPID OF THE CHICK. Poultry Sci. 39(4): 795-797. 1960.—The changes in the infrared spectra of total liver lipids of chicks varies with age. The liver changes appear to be related to an increase in the percentage of phospholipid in the liver lipid. A similar sequence of changes occurs during infection with *Salmonella pullorum*.—C. D. Jeffries (Biological Abstracts)

KAMAR, GAMAL A. R.
THE INFLUENCE OF SEMEN CHARACTERISTICS ON HATCHING RESULTS OF CHICKEN EGGS. Poultry Sci. 39(1): 188-192. 1960.—Eighteen Fayomi cocks were classified into 3 categories of high, medium and low groups, according to their semen characteristics. Two from each group were chosen, each cock was mated to 5 hens and the eggs produced were incubated to study, fertility, mortality and hatchability. Cocks of the low group were almost sterile and no fertile eggs were recorded, while in the other 2 groups fertility, viability and hatchability of eggs rose with the increase in values of semen characteristics. Fertility percentages were correlated with semen volume, sperm motility, sperm concentration and percentage of successful trials. Embryonic viability and hatchability percentages were correlated with sperm motility, sperm concentration and percentage of successful trials.—G. A. R. Kamar. (Biological Abstracts)

KHANYKOVA, O. K. (Lomonosov State U., Moscow, USSR.)
ELECTRIC POLARIZATION IN THE YOLKS OF HENS' EGGS. Biofizika (Transl.) 3(2): 155-160. 1958.—The yolks of hens' eggs show polarization effects in low-frequency fields. The various layers of a fresh egg yolk before incubation show different polarizabilities, the highest occurring in the white area directly beneath the embryo disk and in the latebra. These nonuniformities persist during the first half

of the incubation. The polarizability of the main yolk varies considerably during incubation, three marked rises being found at about days 5-6, 8-9 and 11; the polarizability vanishes as from day 15. Unfertilized eggs show scarcely any change during incubation. In vitro measurements give polarizability indices much lower than are found for minimally damaged yolk. The polarizability is almost completely destroyed by stirring the yolk specimen vigorously with a glass rod for a short while. The changes in yolk polarizability correlate with the changes in the rates of oxidative processes and are evidently due to structural changes in the yolk.—Author. (Biological Abstracts)

KLAMERTH, OLAF. (Inst. Virusforschung, Heidelberg, Germany.)
A RIBONUCLEOTIDE PHOSPHORYLASE IN CHICKEN EMBRYO. Biochim. et Biophys. Acta 42(2): 361-362. 1960. (Biological Abstracts)

KOBAYASHI, H., and **A. GORBMAN.**
RADIOIODINE UTILIZATION IN THE CHICK. *Endocrinology,* 1960, 66, 795-804. (Dept. Zool., Barnard Coll., Columbia Univ., New York.)—In the first experiment, ^{131}I injected into 2-day-old chicks subsequently killed after 6, 12 or 24 h or 2, 3 4 or 7 days was taken up by the thyroid in maximum amount in 12 h; there was much individual variation.

In the second experiment chicks were given a normal starter diet for 8 days and then a low-iodine diet with or without 0.05% thiouracil. In the third, chicks similarly fed had injections daily of KI or of pituitary thyrotropic hormone (THS). After 17 days all were given an injection of 10 μc ^{131}I and at intervals the partition of I in the thyroid was estimated. Thiouracil blocked the synthesis of thyroxine and monoiodotyrosine accumulated, so that the ratio of mono- to diiodotyrosine rose as high as 7.3 at 48 h after injection of ^{131}I. In the normal chicks much less thyroxine was formed in the first experiment than in the second or third. The difference was attributed to season, September as against November and January. There was a difference also in reaction to TSH.—I. Leitch. (Nutrition Abstracts & Reviews)

KODINECJ (KODINEC), G. A. 1958. Uljtrafioletove sprominjuvannja jaecj v rizni stroki sezonu inkubacii.
ULATRAVIOLET RADIATION OF EGGS AT DIFFERENT TIMES OF INCUBATION. *Visn. siljsjkogospod. Nauk. ukr. Akad. siljsjkogospod. Nauk.* 1958(11): 79-80. From abstract in *Referat. Z , Biol.,* 1960 (4), No. 16158.—Experiments were carried out at the Kherson Hatchery in 1956-58. The hatchability of treated eggs was 3-5% higher than that of untreated controls. Radiation with a mercury-quartz lamp for 2 mins. at various times gave best results in Feb.-March and poorest results in May-June. (Animal Breeding Abstracts)

KOSIN, I. L., and **A. M. MUN.** (Washington State U., Pullman.)
CLUTCH SIZE, OVIPOSITION TIME, AND "FLOOR" EGGS AS FACTORS IN TURKEY HATCHABILITY. Poultry Sci. 39(1): 82-92. 1960.—This study, based on some 80,000 eggs laid by Broad Breasted Bronze and "WSW" (a broad breasted white experimental type) hens was conducted over a 4 year period, 1955-1958. Eggs laid in multiple-egg clutches generally showed higher levels of fertility and hatchability than did eggs laid in single-egg clutches. It was tentatively suggested that a hatchability threshold exists for each genetically distinct population, beyond which this difference between the 2 clutch size groups disappears. A genetically lower-hatching line of turkeys exhibited a significantly higher level of abnormally developing embryos from single-clutch eggs. Eggs laid in nests showed considerably higher hatchability and lower apparent infertility. The degree of shell "roughness" in floor eggs was indicative neither of "poorer" shell quality as measured by specific gravity (floatation method) nor of lower developmental rate in early embryos. In general, eggs laid between 5 p.m. and 7:30 p.m. had higher fertility and hatchability levels than those laid before 5 p.m.

Early embryonic development, as determined by in ovo studies, did not appear to have been involved in determining this superiority of evening eggs.—Authors. (Biological Abstracts)

KOSIN, I. L., and IWANE SATO. (South Coll. Osaka U., Japan.)
A STUDY OF ABNORMALITIES IN PARTHENOGENETICALLY DEVELOPING GERM DISCS AND EMBRYOS OF THE DOMESTIC TURKEY. Jour. Morphol. 106(3): 263-276. Illus. 1960.—Although the germ discs from turkey eggs laid by virgin hens possess capacity for parthenogenetic development, it was observed that upon incubation they, in most instances, proceded to develop as "anidian" embryos. The most common type of ontogenesis following 7 days' incubation was formation of membrane-like tissue which was irregular in shape and uneven in thickness. It was interpreted to consist of ecto- and endodermal layers. In cases of more advanced membranous development, which were in the majority, the mesodernal elements were also identified. There was evidence in such membranes of vestigeal formation of 2 areas, identified as area pellucida and area opaca. Such specimens as a rule also showed evidence of hematopoiesis and of concomitant blood vascular growth. One of the prominent abnormalities observed in the more advanced membranous formations was the presence of ectodermal ridges extending to the sinus terminalis. This has been attributed to unequal growth rate between ectoderm on the one hand, and mesoderm and endoderm on the other. When embryos developed, most of them possessed numerous macroscopically detectable structural abnormalities. Incomplete closure of the tube was the most common abnormality. The developmental processes of the parthenogenetic embryos were, invariably, much retarded. The wide range of abnormalities observed in the parthenogenetically developing specimens is believed to be due to variability in the stages at which morphological differentiations had ceased in the germ disc. At the same time, the constituent cells retained their power to undergo mitosis. Twins and duplicants were relatively common among the recognizable embryos in such parthenogenetic development. The observed abnormalities could be reproduced artificially through incubating the normally fertilized eggs for 10 days at 25°C, and then for 7 days at 37.5°C.—Authors. (Biological Abstracts)

LAYNE, ENNIS C., GUILFORD C. RUDOLPH, and SAMUEL P. BESSMAN. (U. Maryland Sch. Med., Baltimore.)
STUDIES ON THE REGULATION OF FATTY ACID AND CHOLESTEROL SYNTHESIS IN AVIAN LIVER. Science 132(3424): 418-419. 1960.—Homogenates of pigeon liver have been incubated with acetate-C^{14} in excess. Simultaneously, substrate for glycolysis was provided as glucose-6-phosphate. The incorporation of carbon-14 into cholesterol was maximal at low levels of glycolysis, whereas fatty acid turnover was maximum at higher glycolytic levels. A regulatory mechanism is proposed to explain the differential synthesis of cholesterol and fatty acids.—Authors. (Biological Abstracts)

Le DOUARIN, G. Les malformations cardiagues obtenues par l'irradiation aux rayons X du coeur de l'embryon de Poulet.
MALFORMATIONS OF THE HEART CAUSED BY X-irradiation of this organ in the chick embryo. Jour. Embryol. and Exptl. Morphol. 8(2): 119-129. Illus. 1960.—The embryos were irradiated on the 3d day of incubation. Those that survived past the 13th day of incubation have been studied. In general, the irradiated embryos show cardiac hypertrophy and internal malformations of the heart. Internal malformations occurred in 46 out of 60 cases. These anomalies can be grouped as follows: incomplete partitioning of the bulfus and the arterial troncus, persistence of the interventricular foramen, anomalous twisting of the bulbus, incomplete formation of the valves. Most of these malformations give rise to a more or less complete mixing of the 2 bloodstreams. But the anomalies do not prevent prolonged survival of the embryos, which can sometimes hatch.—Author. (Biological Abstracts)

LEHRMAN, DANIEL S., PHILIP N. BRODY, and **ROCHELLE P. WIRTIS.** 1961. (Inst. Animal Behavior, Rutgers, Univ., Newark, N. J.)

THE PRESENCE OF THE MATE AND OF NESTING MATERIAL AS STIMULI FOR THE DEVELOPMENT OF INCUBATION BEHAVIOR AND FOR GONADOTROPIN SECRETION IN THE RING DOVE (Streptopelia risoria). *Endocrinology* 68:507-516.—We have studied the effects of stimulii provided by presence of a bird of opposite sex, and by the presence of a nest-bowl and nesting material, on the development of readiness to incubate eggs in male and in female ring doves, and on gonadotropin in females. All subjects had previous breeding experience. The results show that the presence of a male in the cage causes the gradual development, over an 8-day period, of readiness to sit on eggs, and that the additional presence of a nest-bowl and nesting materials augments this effect, starting on about the 6th day. The presence of the female, and of nesting material, have similar effects on the behavior of the male, except that the effect of nesting material may be seen earlier (about the 4th day) in the male than in the female. Gonadotropin activity in the female, as indicated by oviduct growth and by incidence of ovulation, is stimulated by the presence of the male, and augmented by the presence of nesting material. The occurrence of incubation behavior in females is closely associated with that of ovulation, and a number of lines of evidence suggest that a progestin is implicated in the instigation of this behavior.—Authors summary.

LEROY, PIERRE. Action de la lumiere et de l'obscurite sur l'activite testiculaire des Oiseaux.

THE ACTION OF LIGHT AND DARK ON THE TESTICULAR activity of birds. Broteria 28(2/3): 49-68. 1959. (Biological Abstracts)

MacRAE, HERBERT F. (Macdonald Coll. McGill U., Montreal, Canada.), and **ROBERT H. COMMON.**

FORMATION OF 16-EPI-ESTRIOL FROM ESTRADIOL-17β IN THE LAYING HEN. Poultry Sci. 39(3): 707-712. 1960.—Radioactive 16-*epi*-estriol as well as radioactive estradiol, estrone and estriol were identified in extracts of the gut plus excreta of a laying hen that had received an intravenous injection of radioactive estradiol-17β. The bile contained radioactive estradiol, estrone and estriol but radioactive 16-*epi*-estriol was not detected in the bile. It is suggested that 16-*epi*-estriol may be an important metabolite of estradiol-17β in the laying hen.—R. H. Common. (Biological Abstracts)

MAINARDI, BRUNO, and **ANTONIO ZELIOLI.** In tema di pigmentazione della cute e dei tarsi del pollame.

ON THE SUBJECT OF PIGMENTATION OF THE SKIN AND TARSIS IN FOWLS. Zootec. e Vet. 13(9): 340-343. 1958. (Biological Abstracts)

MANCINI, R. E., D. BRANDES, A. PORTELA, I. IZQUIERDO, and **P. KIRSCHBAUM.** (Emory U., Atlanta, Ga.)

AUTORADIOGRAPHY AND HISTOCHEMICAL STUDY OF THE COCK'S COMB IN NORMAL AND HORMONALLY TREATED BIRDS. Endocrinology. 67(3): 430-440. Illus. 1960.—The cock's comb undergoes histological and histochemical changes with the onset of puberty. Before puberty the corium of the comb is constituted mainly of fibrous connective tissue. After puberty the corium undergoes changes which transforms it into a loose variety of connective tissue with a predominance of ground substance. This ground substance stains metachromatically, gives a positive reaction with Hale's colloidal iron and Alcian Blue and displays an ability for the rapid incorporation of $S^{35}O_4$. These changes increased from the 15th to the 60th day of age. Testosterone locally applied to the comb of prepuberal birds changed the fibrous type of connective tissue into a mucloid one rich in mucpolysaccharides with an ability to rapidly incorporate $S^{35}O_4$. Castration of

the post-puberal bird transformed the mucloid connective tissue to a fibrous type as seen in prepuberal birds. The tests for mucopolysaccharides became less intense or negative and the uptake of $S^{35}O_4$ was diminished. The histochemical reactions as well as the uptake of $S^{35}O_4$ decreased or became negative after treatment with hyaluronidase, or with barium hydroxide extraction, thus showing the presence of a sulfated mucopolysaccharide in the ground substance.—Authors. (Biological Abstracts)

MARSHALL, A. J. 1960.
BIOLOGY AND COMPARATIVE PHYSIOLOGY OF BIRDS.—Published by Academic Press, New York. 518 pages. $14.00

McCONACHIE, J. D., F. N. JEROME, and **W. F. PEPPER.** (Ontario Agric. Coll., Guelph, Canada.)
THE EFFECT OF PRE-INCUBATION TREATMENTS ON THE HATCHABILITY OF CHICKEN EGGS. *Poultry Sci.* 39(4): 886-889. 1960.—Comparisons of 3 treatments applied to chicken eggs from Columbian Rock females and White Leghorn females gathered at 9 a.m. and 3 p.m. for 6 days of each of 3 consecutive weeks were made in this experiment. Treatments included (1) holding eggs at a temperature of 60° F, (2) in a room temperature of 75° F 24 hours prior to storage at 60° F, (3) in an incubator at a temperature of 99.5° F for 5 hours prior to storage at 60° F. The eggs were 1-7 days old at the time of setting and the 3 hatches were classed as periods. Percent hatchability for the 4 main effects in the experiment including breed, treatments, periods, and time of gathering indicated that only the breed exerted and significant effect of hatchability.—J. D. McConachie. (Biological Abstracts)

McDONALD, M. W. (Poultry Expt. Sta., Seven Hills, New South Wales, Australia)
EFFECT OF TEMPERATURE OF STORAGE AND AGE OF FOWL EGGS ON HATCHABILITY AND SEX RATIO, GROWTH, AND VIABILITY OF THE CHICKENS. *Australian Jour. Agric. Res.* 11(4): 664-672. 1960.—Fertile White Leghorn eggs were stored for periods ranging from 24 hr to 7 days in environments controlled at 40, 60, or 80° F and 70 per cent. realtive humidity. The eggs were then incubated, and observations on numbers of incubator clears and dead embryos at 10 days and again at 17 days, numbers of chickens hatched, weight at hatching, sex ratio, weight of pullets at 14 days of age, and mortalities were recorded. Eggs stored at 40 and 60° F showed no effect of age of egg on number of clears, dead embryos, or number of chickens hatched. Eggs stored at 80° F showed a rapid fall in number of chickens hatched with age of egg before incubation, this effect being produced by increases in number of clears and dead embryos. Storage at 40° F produced a lower number of chickens hatched than at 60° F, owing to a higher number of incubator clears. There was no difference in sex ratio between chickens hatched from eggs stored at 60 and 80° F, neither departing significantly from 50 per cent pullets. However, storage at 40° F produced significantly more pullets than cocekerels, 54.6 per cent of the chickens being pullets. Storage temperature and age of egg did not affect the hatching weight of the chickens, but when 14 days old, pullets from the eggs stored at 80° F were significantly heavier than pullets from the other groups.—Author. (Biological Abstracts)

MELLEN, W. J., and **B. C. WENTWORTH.** (U. Massachusetts, Amherst.)
COMPARISON OF METHODS FOR ESTIMATING THYROID SECRETION RATE IN CHICKENS. *Poultry Sci.* 39(3): 678-686. 1960.—Goiter-prevention and radioiodine assays for estimating thyroxine secretion rate in chickens were compared with respect to techniques, results, advantages, and weaknesses. Comparisons were based partly on a study of published research and partly on our own experimental

data. Average thyroxine secretion rate was estimated in young crossbred chickens by goiter-prevention and radioiodine assays simultaneously in the same battery room. The mean value obtained from the goiter-prevention test was about 65% of that derived from the radioiodine assay and the difference due to methods was highly significant. In subsequent experiments, a form of radioiodine assay which allows estimation of individual thyroxine secretion rates was used. It is based on measuring effects of increasing thyroxine doses in each bird. Mean secretion rates obtained were between 3.5 and 4.0 μg L-thyroxine/100 g/day. Relatively low within-group variability indicates that this method should be a sensitive one for comparing thyroxine secretion rates among experimental groups of chickens.—W. J. Mellen. (Biological Abstracts)

MELLEN, W. J. 1961. (Poul. Sci. Dept., U. Massachusetts, Amherst.)
EFFECTS OF THIOURACIL LEVEL AND PEN POSITION ON THYROXINE SECRETION RATE DETERMINED BY I^{131} ASSAY. *Poultry Sci.* 40(1): 247-249.—The apparent biological half-life of I^{131} was 8 days in birds fed thiouracil at 0.1% of the ration and 6 days in those fed 0.2%. There were significant differences due to pen location stressing the importance in design of experiments.—From author's summary of results.

MERRITT, E. S., R. S. GOWE, and **J. R. PELLETIER.** (Exptl. Farm, Ste. Anne de la Pocatiere, Quebec, Canada.)
THE REPRODUCTIVE PERFORMANCE OF GEESE IN THEIR FIRST AND SECOND YEAR. *Poultry Sci.* 39(4): 1008-1009. 1960.—Two yearly overlapping unselected populations of geese showed an increase of 55% in egg production in the 2d year over the 1st. Repeatability, on an individual bird basis, was estimated as 0.20. The average hatchability of fertile eggs was 64 and 84% for 1st and 2d year geese respectively.—E. S. Merritt. (Biological Abstracts)

MILBY, T. T., and **D. H. SHERWOOD.** (Larro Res. Farm, Indianola, Iowa.)
THE INFLUENCE OF PRE-INCUBATION TREATMENT ON HATCHABILITY OF CHICKEN AND TURKEY EGGS. *Poultry Sci.* 39(5): 1118-1121. 1960.—Eggs produced by two strains of chickens in one season and two strains of turkeys in two seasons were subjected to the following treatments: (A) Placed in a holding room at 50-55° F as soon as collected. (B) Placed in the holding room overnight, then on the following morning pre-warmed at 100° F for 5 hours and then returned to holding room. (C) Left at room temperature (70-75° F) overnight, then placed in the holding room. Chicken eggs were held from 2-12 days before incubation and turkey eggs 0-14 days. Total number of fertile eggs incubated were 1698 chicken and 16,898 turkey eggs. Differences in hatchability due to treatment did not approcah significance except in the case of one strain of turkeys in one season when the eggs given treatment C were depressed in hatchability. There was some indication that turkey eggs from hens with below average hatchability were improved in hatchability about 2.5% by pre-warming but eggs from hens hatching over 80% were not improved in hatchability. It is suggested that the reason for the difference between the results reported here and those previously published is that eggs produced by genetically superior individuals and/or exposed in a favorable environment before and during incubation are not responsive to pre-incubation warming.—T. T. Milby. (Biological Abstracts)

MUELLER, W. J., A. J. G. MAW, and **E. C. BUSS.** (Pennsylvania State U., University Park.)
THE INFLUENCE OF SEASON AND THE AGE OF LAYERS ON EGG WEIGHT, SHAPE INDEX, ALBUMEN QUALITY AND SHELL THICKNESS. Poultry Sci. 39(4): 854-860. 1960.—The effect of the age of layers on egg weight, shape index, albumen quality and shell thickness was studied using 51 and 162 layers from 2d and 3d

generation of a random-bred Single Comb White Leghorn population, respectively. Egg weight increased continuously from December of the pullet year until April of the 2d year of production. The shape indices of eggs produced during the pullet year were significantly higher than the shape indices of eggs produced during the 2d year of laying. Season had no effect on shape index. Albumen quality declined continuously from December of the pullet year until April of the 2d year of production. The variability of this characteristic during the 2d year of laying was considerably higher than the variability during the pullet year. Shell thickness during the 2d year of production was significantly higher than shell thickness during the pullet year. Analysis of the data showed that this increase was probably caused by environmental factors and not by the increase in age. Correlation coefficients between average egg weight, shape index, shell thickness, and Haugh unit score for the pullet year and corresponding averages for the 2d year of production were .676, .580, 658, and .212, respecitvely—W. J. Mueller. (Biological Abstracts)

MUN, A. M., and **I. L. KOSIN.** (Washington State U., Pullman.)
DEVELOPMENTAL STAGES OF THE BROAD BREASTED BRONZE TURKEY EMBRYO. Biol. Bull. 119(1): 90-97. 1960.—The period of incubation of Broad Breasted Bronze turkey eggs necessary to obtain the various normal stages of development established by Hamburger and Hamilton for the chick embryo is presented. Morphological changes in the "snood" or "leader" were included among the criteria used in describing the later (Hamburger-Hamilton, stage 36 to stage 40) stages of development of the turkey embryo. Measurements of the beak, toe, and foot were obtained from the 17th to the 27th day of incubation. From these measurements, a straight line obtained from the regression of the length of the foot on time was constructed. The equation of this line is presented as well as equations for (1) determining the approximate age of the turkey embryo from measurements of the foot, or (2) the approximate length of the foot from information on the period of incubation.—Authors. (Biological Abstracts)

MUNKACSI, F. 1959. (Anim. Genet. Res. Group, Hungarian Acad. Sci. Godollo.)
ISO-SEROLOGICAL STUDIES IN DUCKS. *Acta biol. (Budapest)*, 10: 101-105. From abstract in *Biol. Abstr.*, 1960, 35, No. 27143.—Investigations were carried out on the blood of hybrids between the Muscovy duck *(Cairina moschata)* and domestic ducks of the Pekin and Khaki Campbell breeds in order to determine the causes of hybrid sterility. (Animal Breeding Abstracts)

NAGAOKA, YOSHIO. (Kyushu U., Japan.)
A STUDY ON THE MUSCULATURE OF BIRDS. (In Japanese with English summ.) Igaku Kenkyu 29(9 extraed.): 3224-3256. Illus. 1959.—The musculature of the domestic fowl and duck are studied comparative anatomically, and results showed by figures.—Author. (Biological Abstracts)

NAKAYAMA, GOICHI, and **JUN SERIZAWA.**
THE RESPONSE OF POSTERIOR PITUITARY HORMONES ON THE BLOOD PRESSURE OF DECAPITATING COCK. IN ADDITION, THE RESPONSE OF A FEW DRUGS. (In Japanese with English summ.) Bull. Natl. Hyg. Lab. 76. 173-177. Illus. 1958.—A method of decapitating cocks is described; in this preparation, the action of several hormones was studied. Posterior pituitary hormone and natural and synthetic oxytocin elicit a small decrease in blood pressure, followed by a secondary very prolonged pressor response; vasopressin injection caused only an evanescent pressor response. Histamine and acetylcholine elicit a response similar to that of posterior pituitary injection, except it is not prolonged. Epinephrine injection elicits only an evanescent pressor response. Extracts from the pituitary gland of cocks, big-eye-tuna, bonito fish and ox elicit a response similar to that of posterior pituitary injection.—Auth. summ. (Biological Abstracts)

NEWCOMER, EARL H., GRACE M. DONNELLY, and WILIAM C. FORBES. (U. Connecticut, Storrs.)
A CYTOLOGICAL STUDY OF SEX REVERSAL IN THE DOMESTIC FOWL. Poultry Sci. 39(4): 1030-1037. Illus. 1960.—Sex reversion of the genetically female fowl was apparently caused by an increase in the number of autosomes resulting from an ovarian tumor. Cytological evidence is supplied supporting the theory of a sex/autosomal balance mechanism existing in the fowl.—E. H. Newcomer. (Biological Abstracts)

NISHIDA, T., A. UENO, and F. A. KUMMEROW.
METABOLISM OF CHOLESTEROL-4-C^{14} IN BILE DUCT CANNULATED CHICKS AND RATS. *Circulation Res.*, 1960, 8, 742-748. (Dept. Food Technol., Univ. Illinois, Urbana.) Interlingua summary.—Day-old chicks were given for 1 week a purified basal diet containing 1% maize oil and were then divided into 4 groups and given for 4 weeks diets containing either 15 or 30% protein and with or without 1% cholesterol. At 5 weeks of age the neck of the gall bladder was ligated and the hepatic and cystic ducts were cannulated. An emulsion of cholesterol-4-^{14}C was injected intraperitoneally and bile was collected for 72 h. Weanling rats reared on a stock diet for 5 weeks were given synthetic diets containing 8 or 28% casein for 6 weeks, at the end of which some were provided with bile duct cannulae. After 24 h emulsion containing cholesterol-4-^{14}C was injected and bile was collected as in the chick experiment.
In chicks, the rate of excretion of ^{14}C into bile was greater on the high-protein diet and cholesterol was without effect. Findings were similar for rats although the isotope was excreted into bile about 5 times as fast as in the chick. The cholesterol content of the liver appeared to have no effect on the rate of degradation of cholesterol.—A. K. Lough. (Nutrition Abstracts & Reviews)

NOVIKOV, B. G. 1958. Do analizu somaticnoi indukcii u ptahiv.
ANALYSES OF SOMATIC INDUCTION IN POULTRY. *Visn. kiivsjk. Univ.*, 1958, No. 1, Ser. biol., Vip. 1: 117-122. (Russian summary.) From abstract in *Referat. Z., Biol.*, 1960 (3), No. 11600.—Testes were transplated between White Leghorns and Rhode Island Reds. The testes were functional and produced semen which was used to inseminate ♀♀. Similar results were obtained with ducks. (Animal Breeding Abstracts)

OSHIMA, M., and H. NOZAKI.
ON THE ALBUMEN SECRETION IN THE LAYING HEN. THE SECRETION IN THE MAGNUM DURING THE PASSAGE OF THE EGG. (Japanese summ.) Bull. Natl. Inst. Agric. Sci. Ser. G 19. 69-73. 1960.—Formation of egg albumen, especially the amount of albumen secreted during passage through the magnum to the total albumen in the egg was examined. The magnum containing the passing yolk was taken from the laying hen and the difference of the albumen content between a part of tissue, through which the egg just has passed, and another part, through which the egg was just going to pass was estimated. A decrease of about 46% of N was ascertained per unit amount of magnum tissue (DNA) due to passage of the egg. When the total amount of N taken away from the magnum during the passage was calculated it averaged 88% of the laid egg's albumen N. Thus it was confirmed that large parts of the proteins of egg albumen (about 90%) were formed in the magnum before passage, and the fraction which was secreted and deposited to the yolk during its passage formed but a small proportion of the total protein in egg albumen.—Authors. (Biological Abstracts)

PANDA, B. (U. Maryland, College Park, Md.)
THE BURSA OF FABRICIUS—ITS RESPONSE TO SEX STEROIDS AND ITS ROLE IN ANTIBODY PRODUCTION—A REVIEW. Indian Vet. Jour. 37(5): 140-146. 1960.—The growth, function and response to sex steroid of the bursa of Fabricius is reviewed.—K. N. Mehra. (Biological Abstracts)

PANOMAREVA, O. E.
THE EFFECT OF EARLY PARTIAL DECORTICATION ON VISUAL AND AUDITORY CONDITIONED REFLEXES IN CHICKENS. Biull. Eksptl. Biol. I Med. (Transl.) 48(11): 1330-1337. 1959.—Removal of the cerebral hemispheres, including the corpora striata, in young chicks has a marked effect on their subsequent conditioned reflex activity. The stability and regularity of the conditioned reflexes is reduced, and differentiation of the visual and of the auditory conditioned signals deteriorates. Removal of the rudimentary cortical areas in young chicks has little effect on their subsequent reflex activity, and does not affect accurate visual or auditory differentiation. Disturbances of visual and auditory analysis caused by injury to the corpora striata are found also in adult hens, but do not occur when only the rudimentary cortical areas are destroyed. Cortical areas removed from young chicks regenerate, while there is no recovery from damage to the corpora striata.—Auth. summ. (Biological Abstracts)

PAYNE, LOYAL, AMOS KAHRS, and CARL POLLEY. (Kansas State U., Manhattan.)
A STUDY OF SEMEN PRODUCTION IN TURKEYS. Poultry Sci. 39(1): 29-35. Illus. 1960.—Volume and density of semen was obtained weekly from 13 Broad Breasted Bronze males from June to December. Males varied in volume produced from a trace to .55cc. Eight, or 62%, produced semen throughout the 30 weeks. Mean volume per ejaculate was .29cc, while number of sperm, ranged from 216 million to 2514 million with a mean of 1488 million. The combined weight of both testes from 11 males averaged 42.33 g. The left organ was larger than the right in most males. It averaged 59.9% of the total weight while the mean of the right organ was 40.1% of the total weight of both organs. Males with large testis produced larger volumes of semen with greater numbers of sperm per cu mm. than males with small testis; however differences were not significant.—L. Payne. (Biological Abstracts)

PEREZ GARCIA, T, and A. ABEGER MUNOZ. 1959. Accion de los estrogenos sinteticos sobre la funcion genesica del gallo.
THE ACTION OF SYNTHETIC OESTROGENS ON SEXUAL FUNCTIONS OF THE COCK. *Rev. Patron. Biol. anim. (Madr.)*, 5: 203-213.—Ten White Leghorn cocks aged 10 mths., fed on the same rations, were divided into 2 groups of 5. One group received subcutaneous implants of 30 mg. hexoestrol in the neck and the other served as controls. Body changes noted in the experimental group are described and discussed. The influence of the implant was most noticeable by the 4th month, when a 19% increase in body weight was recorded. Male appearance and behaviour began to return thereafter and were normal by the 5th month but spermatogenesis was not normal until the 8th month after implantation. (Animal Breeding Abstracts)

PERK, K., M. PEREK. (Hebrew U., Rehovot, Israel.), **K. LOEBL, and D. ALLALOUF.**
CHEMICAL AND ELECTROPHORETIC ANALYSIS OF YOUNG CHICKEN SERUM FOLLOWING SEX HORMONES ADMINISTRATION. I. PROTEINS AND PROTEIN DISTRIBUTION. Poultry Science 39(3): 775-780. 1960.—The effects of subcutaneous pellet implantation or intramuscular injection of diethylstilbestrol, testosterone propionate, and of both combined, on protein content and protein paper electrophoretic distribution in sera of 92 ten-week-old White Leghorn chickens were studied. Treatment with diethylstilbestrol resulted in a rise of total serum proteins. This rise is mainly due to an increase in the globulins, entailing a decrease in the A/G ratio. Paper electrophoretic analysis showed that the changes in the globulin fractions involved mainly the alpha-2 and beta-3. With the same method the relative value for albumin was significantly decreased. Testosterone produced no significant changes in the serum proteins. Treatment with both hormones combined produced disparate responses and requires further investigation.—K. Perk. (Biological Abstracts)

PERK, K., M. PEREK. (Hebrew U., Rehovot, Israel.), **K. LOEBL,** and **D. ALLALOUF.**

CHEMICAL AND ELECTROPHORETIC ANALYSIS OF YOUNG CHICKENS SERUM FOLLOWING SEX HORMONES ADMINISTRATION. 2. CHOLESTEROL AND CHOLESTEROL DISTRIBUTION. Poultry Sci. 39(4): 798-801. 1960.—Treatment with subcutaneous implantation or injection of diethylstilbestrol resulted in a very marked increase in total serum cholesterol in 10-week-old chickens The paper electrophoretic cholesterol pattern in untreated chicken sera displayed 2 distinct bands, alpha and beta cholesterol. Following administration of diethylstilbestrol, the entire amount of cholesterol became associated with the slower migrating beta lipoprotein. Testosterone propionate administration did not affect significantly the total serum cholesterol levels and their electrophoretic distribution. Combined diethylstilbestrol and testosterone propionate treatment resulted in a lack of uniformity of response regarding cholesterol levels, while its distribution was similar to the pattern obtained by diethylstilbestrol treatment alone. —M. Perek. (Biological Abstracts)

PLANAS, J. Contenido en hierro y capacidad total de fijacion del suero en el pavo.

IRON CONTENT AND TOTAL IRON-BINDING CAPACITY OF SERUM IN THE TURKEY. *Rev. espanola Fisiol.*, 1960, 16, 33-37. (Lab. Biol., Fac. Cienc., Univ. Valladolid.) English summary.—In 10 male turkeys the average Fe content of serum obtained by complete bleeding was 70 ± 16.2, range 15 to 170, μg per 100 ml and in 10 females, when not in lay, 104.9 ± 14.5, range 45 to 200. Average total iron-binding capacity was 302.1 ± 12.2 μg Fe per 100 ml in males and 315.2 ± 14.8 in females. Both estimations were by the methods of Ramsay (Absts. 124, 125, Vol. 28). The coefficient of saturation of transferrin

$$\left(\frac{\text{serum Fe} \times 100}{\text{serum iron-binding capacity}} \right)$$

showed greater variation in males than in females; average values were, respectively, 24.7 ± 5.4 and 33.6 ± 4.4%.

It was concluded that serum Fe values were not influenced by sex.—I. R. Anderson. (Nutrition Abstracts & Reviews)

PORTET, R. (Lab. Gen. Phys. Fac. Sci., Paris, France.) Effet de la thryoxine sur les echanges respiratories de l'embryon de poulet.

EFFECTS OF THYROXINE ON RESPIRATORY EXCHANGES BY THE CHICK EMBRYO. Jour. Physiol. (Paris) 52(1): 200-201. 1960.—Abstract. (Biological Abstracts)

PRINCE, R. P., L. M. POTTER, and **W. W. IRISH.** 1961. (Depts. Agric. Eng. and Poult. Sci., U. Connecticut, Storrs. Conn.)

RESPONSE OF CHICKENS TO TEMPERATURE AND VENTILATION ENVIRONMENTS. *Poultry Sci.* 40 (1): 102-108.—Increasing the environmental temperature, on White Plymouth Rock chickens from 4 to 8 weeks of age, from 45°F. to 75°F. resulted in linear decrease in feed consumption, amounting to 0.472 lb. per bird or 8.6% between these two temperatures. Lowering the ventilation rate from 2 to ¼ cfm. per bird decreased feed consumption by 0.126 lb. per bird. The slightly greater weight gains of the chicks in the higher temperature environment was not significant and no difference in weight gain was noticed which would be attributable to the decreased ventilation rates. A highly significant linear effect of temperature on feed efficiency resulted, amounting to 12.5% increase attributable to increasing the temperature from 45°F. to 75°F.—From authors summary.

ROOS, THOMAS BLOOM.

HORMONAL MODIFICATION OF CIRCULATING LIPEMIA-CLEARING FACTOR AND ITS RELATION TO LIPID METABOLISM IN MICE AND PHEASANTS. Dissertation Absts. 21(1): 278. 1960.—Abstract. (Biological Abstracts)

SAEKI, Y. 1959.
SEASONAL CHANGES IN TESTICULAR FUNCTION OF COCKS AND EGG PRODUCTION OF HENS. *Niwatori-no Kenkyu*, 34 (1): 72-74, 77-78. (In Japanese.) From abstract in *Referat. Z., Biol.*, 1960 (6), No. 26030.—Semen samples were obtained from Nagoya and White Leghorn cocks twice a month for 1 yr. Semen volume increased progressively from 0.18 ml in summer to 0.23 ml in the following spring. Spermatozoal concentration was greatest in spring and minimal in summer. Stored at 8° (? C.) spermatozoa survival rate was highest in May and lowest in Nov. Histologically the testes were best developed in March and least developed in Aug. Egg production was highest in April and then declined until Dec. (Animal Breeding Abstracts)

SAHA, ANIL. (California Inst. Technol., Pasadena.), and **JHARANA GHOSH.**
BIOSYNTHESIS OF CHICK HEMOGLOBINS. Science 132(3425): 468-470. 1960.—In vivo studies of the biosynthesis of chick hemoglobins 1 and 2 showed an over-all higher incorporation of glycine-2-C^{14}, valine-4-C^{14}, valine-1-C^{14}, leucine-G-C^{14}, and histidine-(2-ring)-C^{14} in hemoglobin 2; in vitro studies made with intact nucleated chick erythrocytes showed the higher incorporation of glycine-2-C^{14}, valine-1-C^{14}, and histidine-(2-ring)-C^{14} in hemoglobin 1. Hybridization of chick hemoglobins produced an electrophoretically distinguishable new component.—Authors (Biological Abstracts)

SCHINDLER, H., S. BORNSTEIN, E. MOSES, and **I. GABRIEL.** 1959.
FERTILIZATION RATE OF CHICKENS INSEMINATED IN THE AFTERNOON OR EVENING. Reprinted from *Ktavim. Rec. agric Res. Sta. (Rehovot)*, Engl. Ed. 9: 287-290.—Three trials using White Leghorn cocks and hens not previously inseminated were made. Hens were inseminated at 3 p.m. and 8. p.m. with 1/10 $cm.^3$ semen diluted 1 : 2 in Locke's solution. In the first 2 trials fertilisation was higher at 8 than at 3 p.m. but the results were only significant in the first trial. In the 3rd trial, with a reversal design, the differences in percentage of fertilised eggs between the two hours of insemination were small and non-significant; nor were there any statistically significant differences in fertility between individual cocks. It is concluded that the higher mating activity and higher sperm yield in late afternoon reported by other workers do not necessarily imply higher fertilisation rates in the conditions prevailing in this experiment. (Animal Breeding Abstracts)

SCHORGER, A. W. (U. Wisconsin, Madison.)
THE CRUSHING OF CARYA NUTS IN THE GIZZARD OF THE TURKEY. Auk 77(3): 337-340. Illus. 1960.—Pecans (*Carya pecan*) are eaten extensively by wild turkeys and hickory nuts (*Carya* spp.) to a limited extent. After 24 hours without food, the nuts were force-fed to female Broad Breasted Bronze domestic turkeys that were killed at intervals to determine the condition of the nuts in the gizzard. Wild pecans were crushed within one hour while nuts of the shellbark hickory (*Carya ovata*) required 30 to 32 hours. Due to the great variation in the resistance of the hickory nuts to mechanical crushing, the time required for crushing in the gizzard must be considered approximate.—A. W. Schorger. (Biological Abstracts)

SIEGEL, H. S., and **W. L. BEANE.** 1961. (Poult. Dept., Va. Polytech. Inst., Blacksburg.)
TIME RESPONSES TO SINGLE INTRAMUSCULAR DOSES OF ACTH IN CHICKENS. *Poultry Sci.* 40 (1) 216-219.—Although single 3 U.S.P. unit intramuscular doses of ACTH did not significantly alter adrenal weights relative to body weight in 46-day old male chickens, regression of spleen and bursa weights, adrenal cholestrol depletion, and plasma hyperglycemia and hypercholesteremia did occur. The results

indicated that increased secretion of adrenal cortical steroids did occur as a result of ACTH stimulation and that time modified these responses. —Authors summary.

SINHA, M. D., R. K. RINGER, T. H. COLEMAN, and **H. C. ZINDEL.** 1959. (Dep. Poult. Sci., Michigan State Univ., East Lansing.)

THE EFFECT OF INJECTED THIOURACIL ON BODY WEIGHT AND HATCHABILITY OF THE CHICK EMBRYO. *Poult. Sci.*, 38: 1405-1409.—Firstly, the toxicity level of injected thiouracil on the developing chick embryo was investigated. S.C. White Leghorn eggs fertile at 48 hrs. were divided into 7 groups of 12 eggs each and injected with 0.1, 0.5, 1.0, 2.0 or 5.0 mg. thiouracil; group 6 received an injection of 0.5 ml. sterile Ringer's solution and group 7 was untreated. The 5.0 mg. injection was lethal. With other thiouracil dosages, 5-10 embryos in each group survived to the 21st day of incubation.

Secondly, the effect of thiouracil on body weight was investigated. 112 dozen hatching eggs were injected at 48 hrs. with 0.1, 0.2, 0.5, 1.0, or 2.0 mg. thiouracil plus 0.5 ml. sterile Ringer's solution; one group were injected with Ringer's solution alone and one group served as controls. On each day from the 7th to the 21st day of incubation, 12 eggs were randomly selected, killed, and embryo body weights recorded. Thiouracil injection depressed embryo body weights at any given time after treatment. Different levels of thiouracil produced no significant differences from the 7th to the 11th day of incubation but thereafter significant differences became evident. The incubation period was prolonged by the injection of thiouracil into 48-hr. embryos. (Animal Breeding Abstracts)

SMITH, A. H. 1959. (Dep. Poult. Husb., Univ. California, Davis.)

FOLLICULAR PERMEABILITY AND YOLK FORMATION. *Poult. Sci.*, 38: 1437-1446.—From observations on the transfer of plasma protein and phosphorus compounds into the developing yolk of oviducal eggs in New Hampshire hens it was noted that, in some cases, deposition of protein over the yolk surface was uneven. The possible relationship between this phenomenon and "mottling", an abnormal yolk coloration of some ecoonomic importance, is discussed. (Animal Breeding Abstracts)

SMYTH, JR., J. R., D. L. ANDERSON, and **R. GLEASON. 1961.** (Poult. Sci. Dept., U. Massachusetts, Amherst.)

THE EFFECT OF LIGHT ON PERFORMANCE AND BEHAVIOR IN DIETHYLSTILBESTROL TREATED MALE TURKEY BROILERS. *Poultry Sci.* 40 (1) 258-260.

SOEDARMO, D., M. R. KARE, and **R. H. WASSERMAN.** 1961. (Depts. Physiol. and Phys. Biol., N. Y. State Vet. Coll, Cornell U., tIhaca, N. Y.)

OBSERVATIONS ON THE REMOVAL OF SUGAR FROM THE MOUTH AND THE CROP OF THE CHICKEN. *Poultry Sci.* 40 (1) 123-128.—A study using 134 chicks was conducted on the absorption of glucose and xylose from the mouth cavity and the crop. Glucose at all concentrations was removed from the ligated crop. The rate of removal reached a peak and was observed to plateau or decrease with time. Xylose was not removed in appreciable amounts from the ligated crop. Radioactivity was detected in the circulatory system after labelled glucose was introduced into the crop but not after the introduction of labelled xylose. Similar radiocarbon studies indicated that both xylose and glucose were removed from the mouth. The fact that the crop discriminates between glucose and xylose was considered in light of the taste preference data where xylose was actively rejected and glucose tolerated; other physiological and nutritional aspects of the results were considered.—Authors summary.

STAHL, P., and **C. W. TURNER.** 1961. (Dept. Dairy Husb., U. Missouri, Columbia, Missouri.)

SEASONAL VARIATION IN THYROXINE SECRETION RATES

IN TWO STRAINS OF NEW HAMPSHIRE CHICKENS. *Poultry Sci.* 40 (1) 239-241.—The seasonal variation in thyroxine secretion rate (TSR) under Missouri conditions in two strains of New Hampshire fowls, originally selected for 3 generations on the basis of their response to feeding thiouracil, has been determined. The mean TSR of the high strain of the two sexes during the winter season (Sept.-April) was 2.97 ± 1.43 μg./l-thyroxine/100 gm. body weight with a range of 0,5 to 6.0 μg. During the summer season (May-Sept.) the TSR of the high strain of the two sexes was reduced to a mean of 1.24 ± 0.47 μg/100 gm. with a range of 0.75-1.5 μg. This is a decline of 58.3% in TSR from winter to summer season. The mean TSR of the low strain during the winter season was 1.01 ± 0.47 μg./100 gm. body weight with a range of 0.5-2.5 μg. The corresponding TSR during the summer season was 0.59 ± 0.02 μg/100 gm. body weight with a range of 0.25-1.0 μg. This is a decline of 41.6% from winter to summer season in TSR.—Authors summary.

STEPHENSON, E. L., and **ROBERT H. ROBERSON.** (U. Arkansas, Fayetteville.)

THE FATE OF PENICILLIN AND PENICILLAMINE WHEN INCUBATED WITH CONTENTS OF THE PROVENTRICULUS AND DUODENUM OF THE CHICK. Poultry Sci. 39(5): 1224-1225. 1960.—Penicillin and penicillamine were incubated with both the contents of the proventriculus and duodenum. Penicillamine was quickly destroyed in the contents of the proventriculus but through use of the paper chromatogram could be detected after it had been incubated with the contents of the duodenum for 25 minutes. Penicillin yielded penicillamine after incubation with the contents of the duodenum. No penicillamine was detected after incubation of penicillin with contents of the proventriculus.—E. L. Stephenson. (Biological Abstracts)

STRITE, G. H. 1959. (Ohio State Univ., Columbus.)

STUDY OF THE RELATIONSHIP OF THE THYMUS GLAND TO CHICK GROWTH. *Diss. Abstr.*, 20: 1981-1985. (Animal Breeding Abstracts)

SUZUKI MIDORI, and **HIROSHI NOZAKI.**

ROLE OF INORGANIC $^{35}SO_4$ IN EGG WHITE IN EMBRYONIC DEVELOPMENT OF THE CHICK. (In Japanese with English summ.) Bull. Natl. Inst. Agric. Sci. Ser. G (Japan) 18. 179-187. Illus. 1959.—Almost all amounts of SO_4 in ash of chicken egg white, and the large part of S exists in non-protein fraction. The authors intended to investigate the role of the inorganic sulphate in the egg white during incubation period and used $S^{35}O_4$ for this experiment. Neutral $S^{35}O_4$ solution (0.1 ml or 20 μc) was injected into egg white on the 4th day of incubation. The control eggs were injected with the same amount of saline solution. As the embryos grew up, the turnover and the incorporation of S^{35} were traced on the various incubation days. The experimental results were as follows: The injected S^{35} almost disappears from the egg white on the 10th day and thereafter. S^{35} increases gradually in the yolk at this stage. This sulphur is almost in the trichloroacetic acid soluble fraction during the incubation time, and S^{35} protein is so little that it may be assumed to be due to the contamination. The amount of S^{35} in the trichloroacetic acid fraction of embryo increases rapidly until the 10th day and thereafter decreases gradually. Just at this time S^{35} in protein in embryo increases rapidly, reaching the maximum on the 12th or 13th day and then decreasing gradually. According to the data, it may be presumed that much inorganic sulphate in the egg white is transmitted to the yolk without any chemical change in the primary period of the incubation and then the yolk sulphate is absorbed rapidly by chick embryo at the middle stage. It is considered that many kinds of complicated S compounds may be bio-synthesized in the embryo itself. Each protein fraction of the embryo contains such S^{35} on the 11th, 12th, 13th, 14th

and 15th days of the incubation. The protein fraction contains always methionine and cystine spots on the paper-chromatograms developed with the hydrolysate, the sulphur on the spots being verifiable with KI-$PtCl_4$ reagent. The autoradiogram of the paper-chromatograph shows the existence of S^{35} on the cystine spot, but none on the methionine spot. The eluted solution from the methionine spots has no radioactivity when measured with the G. M. counter. From these facts it is suggested that the chick embryo might have some strong cystine synthesizing ability from simple S-compounds, but it could hardly utilize both inorganic sulphur and cystine to make up methionine.—Authors. (Biological Abstracts)

TANAKA, KATUHIDE, and **SEIICHI NAKAJO.** (Nagova U., Japan.)
OXYTOCIN IN THE NEUROHYPOPHYSIS OF THE LAYING HEN. Nature 187(4733): 245. 1960. (Biological Abstracts)

TANABE, YUICHI. (Nat. Inst. Agric. Sci., Chiba, Japan.)
THYROID AND ALKALINE PHOSPHATASE. Endocrinol. Japan 7(2): 153-156. 1960.—Effects of physiological modifications of thyroid function on serum alkaline phosphatase level in the chicken were studied. The administration of daily doses of 24 μg and 48 μg of L-thyroxine for 4 days into 6-week-old cockerels caused a significant (100-200%) increase in serum alkaline phosphatase level. Feeding of 0.2% thiouracil in diet for 14 days to 7-week-old cockerels significantly decreased (50%) serum alkaline phosphatase level. Serum alkaline phosphatase level seems to be controlled by thyroid function in the chicken.—Author. (Biological Abstracts)

TAPPER, D. N., and **M. R. KARE.**
BLOOD GLUCOSE DISTRIBUTION IN THE DOMESTIC FOWL. *Proc. Soc. Exp. Biol. Med.*, 1960, 103, 789-790. (Dept. Physiol., N.Y.S. Vet. Coll., Cornell Univ., Ithaca.)—Single Comb White Leghorn and Rhode Island Red chickens were used. All except day-old chicks were fasted for periods increasing with age to 18 h in adult laying hens. Values for plasma were between 91 and 104% of whole blood glucose. The highest value was for newly hatched chicks. Whole blood glucose was between 153 and 190 mg per 100 ml. There was no change in glucose distribution during the change from foetal to adult erythrocytes.—J. C. Rigg. (Nutrition Abstracts & Reviews)

TAYLOR, T. G., and **F. HERTELENDY.** 1961. (Dept. Physiol. Chem., Univ., Reading, England.)
CHANGES IN THE BLOOD CALCIUM ASSOCIATED WITH EGG SHELL CALCIFICATION IN THE DOMESTIC FOWL. 2. CHANGES IN DIFFUSIBLE CALCIUM. *Poultry Sci.* 40 (1) 115-123. —The pH of the plasma of laying hens increases by approximately 0.3 units when it is exposed to the air for 3 hours, accompanied by a decrease of 1-2 mg./100 ml. in the diffusible calcium. Using an ultra filtration method for determining diffusible calcium on as little as 3 ml. of hen plasma under conditions of controlled pH, shell calcification was almost always associated with a fall in diffusible plasma calcium from 0.1-2.6 mg./100 ml., normally accompanied by a decrease in total calcium. Slight increases in total calcium were sometimes found when the decrease in diffusible calcium was small. Total plasma calcium decreases of more than 2 mg./100 ml. were invariably associated with decreases in non-diffusible calcium, small decreases in total were frequently associated with increases in diffusible calcium. A low calcium diet accentuated the changes and after 48 hours decreases were very large in all fractions. These were related to changes in medullary bone.—From authors summary.

TINDALL, DALE, and **J. V. CRAIG.** 1960. (Dept. Poultry Husb., Kansas State U., Manhattan.)
GENETIC VARIATION IN SOCIAL AGGRESSIVENESS AND COMPETITION EFFECTS BETWEEN SIRE FAMILIES IN SMALL

FLOCKS OF CHICKENS. *Poultry Sci.* 39: 1318-1320.—Significant differences in aggressiveness were found between pullets of eight sire familes of one strain indicating that additive genetic variation was present. Within-flock correlations of small magnitude were found to exist when social rank was correlated with sexual maturity and hen-housed egg production. Competition effects between sire families within small flocks were small and nonsignificant.—Authors summary.

TOHARA, SABURO, AKIRA MIYAKAWA, and **BUNSAKU WAGAI.**
ANATOMICAL AND STEREO-RADIOGRAPHICAL STUDIES ON THE DISTRIBUTION OF ARTERIES IN FOUR LEGS OF FOWL AND DUCKS. (In Japanese with English summ.) Bull. Natl. Inst. Agric. Sci. Ser. G. (Japan) 18. 203-221. Illus. 1959.—The distribution of arteries in four legs of fowl and ducks was studied with the stereo-radiograph and the following results were obtained, revealing several discrepancies with the previous anatomical descriptions. The distribution of arteries in four legs of the fowl is substantially the same as that of the duck. The continuation of the ulnar artery sends out one branch to the second digital bone and divides itself into two branches; one runs down along the third metacarpal and the third digital bones, and the other along the fourth metacarpal and the fourth digital bones. These branches should be named the third metacarpal, the fourth metacarpal, the second digital, the third digital and the fourth digital arteries respectively. The axial artery of the primary feather tract ramifies from the metacarpal and the fourth digital arteries, though that of the secondary feather tract ramifies from the radial arterial branch that runs along the ulna. There are two unnominated branches that ramify at th upper portion of stifle joint; one runs down at the back of the joint and the other distributes at the distal end of the femur. Also, at the lower part of the joint, spring three branches; the first branch runs down along the inner side, the second along the outer side, and the third at the posterior side of their tibia. The above two branches which ramify from the upper portion of the stifle joint should be named the posterior femoral artery and the superior popliteal artery in the same way as in the case of domesticated animals. Also, the three branches which originate at the lower part should be named the medial, the lateral or the posterior muscular branches of the popliteal artery according to the position. The proper digital arteries that distribute on the toes of hind legs are the continuation of the anterior tibial artery and a first the later divides into two branches and then each into two branches. They run along the first, the second, the third and the fourth digital bones. Thus, the four branches should be named the first digital, the second digital, the third digital or the fourth digital arteries. Also, there are very small arteries at the opposite side of the proper digital arteries and each pair anastomose to each other by means of twigs. The nutrient arteries of the leg bones enter into the nutrient foramen and divide themselves into ascending and descending branches in the bones and snake toward the digital and proximal ends.—Authors. (Biological Abstracts)

TONOUE, T., and **K. MATSUMOTO.** 1961. (Dept. Anim. Sci., Fac. Agr., Hokkaido U., Sapporo, Japan.)
SERUM ALKALINE PHOSPHOTASE RESPONSE TO THE INJECTION OF THYROXINE IN YOUNG CHICKENS. *Poultry Sci.* 40 (1) 206-212.—The rapid rise in serum alkaline phosphotase activity normally observed in non-treated birds for 10 to 12 days after hatching was caused to disappear by 10 μg. thyroxine per 100 gm. of body weight on every other day. This decrease was found early but not later in age. Renal phosphotase curves corresponded. The dose relationship was non-linear when thyroxine was injected as 4 to 12 μg. per 100 gm. of average body weight for 2 weeks after 25th day post hatch.—From authors summary.

TSUNOO, SHIGERU, et al. (Showa Med. Sch., Tokyo, Japan.)
STUDIES ON THE EXPERIMENTAL MALFORMATION OF

CHICK EMBRYO. (In Japanese with English summ. p. 44) Folia Pharmacol. Japonica 55(5): 1051-1060. Illus. 1959.—Nicotine, nornicotine and nicotine tartrate, respectively administered into fertile White Leghorn eggs, caused various malformations of the chick embryos The embryos were seriously affected in their body weight, body and limb length and its proportion. In the radiographical appearnce, their flat bones were damaged. While metanicotine set up no such anomalies. Sulfanilamide, sulfathiazole, sulfaguanidine and sulfisoxazole proved to induce malformations of chick embryo, alike. Their leg length was shortened compared with that of control, and the long bones were deformed in radiographical examination. Furthermore, remarkable struma of the embryo was experimentally induced.—Authors. (Biological Abstracts)

UENO, K. 1958. (Kyushu Univ., Fukuoka.)
THE RELATION BETWEEN THE PROCESS OF EGG-SHELL FORMATION AND THE OSSIFICATION IN THE HEN. *Igaku Kenkyu (Acta med.)*, 28: 3568-3584. (Japanese with English summary.) Title in *Biol. Abstr.*, 1960, 35, No. 20895. (Animal Breeding Abstracts)

URIST, MARSHALL R., NANCY M. DEUTSCH, GEORGE POMERANTZ, and FRANKLIN C. McLEAN. (U. California, Med. Center, Los Angeles.)
INTERRELATIONS BETWEEN ACTIONS OF PARATHYROID HORMONE AND ESTROGENS ON BONE AND BLOOD IN AVIAN SPECIES. Amer. Jour. Physiol. 199(5): 851-855. 1960.—The level of calcium was measured in whole serum and ultarfiltrates of serum of roosters and laying hens following parathyroidectomy or after treatment with parathyroid extract, and in the presence or absence of the effects of endogenous or exogenous estrogens. The results were correlated, with changes in: 1) the weight of various endocrine organs influencing calcium metabolism in avian species, and b) microradiographic and histologic sections of the bones. The parathyroid hormone and estrogen had an additive effect upon the serum calcium, rather than a synergistic action. The effect of each hormone was readily distinguished by the interpretation that while ultarfilterable calcium was under parathyroid control, the large increase in the nonultrafilterable fraction under the influence of estrogen depended upon the formation of calcium phosphoproteinate complex by the liver. Under all conditions, the interrelations between the ultrafilterable and the nonultrafilterable fractions of the serum calcium were those dependent upon a mass-law equilibrium. —Authors. (Biological Abstracts)

VARELA, G., F. SANZ, F. LOPEZ GRANDE, and J. BOZA LOPEZ. La Protovertrina En La Declinacion Estival De La Puesta En Los Anades.
PROTOVERTARINE IN RELATION TO THE DECLINE IN DUCK-EGG PRODUCTION DURING THE SUMMER. Arch. Zootecnia 9(33): p. 3-7. 1960.—The authors cite the fact that elevated environmental temperatures lower egg production. The work of other investigators has shown that protovertarine has a marked tendency to lower abdominal temperature in laboratory animals. One lot of chicks received 4 mg and another 5 mg of protovertarine per 100 kilos of feed. Controls were also provided for. Results obtained by the authors tended to show that the drug Protoveratrine did have a counter effect against the lowering of egg production by high environmental temperatures.—D. F. Watson. (Biological Abstracts)

WALDROUP, P. W., C. R. DOUGLAS, J. T. McCALL, and R. H. HARMS. 1960. (Florida Agric. Exp. Sta., Gainesville.)
THE EFFECTS OF SANTOQUIN ON THE PERFORMANCE OF BROILERS. *Poultry Sci.* 39: 1313-1317.—The value of the addition of 0.0125 percent ethoxyquin to broiler diets on growth rate, feed utilization and pigmentation of broilers has been sudied in two separate

experiments. The addition of the antioxidant to the diet significantly increased deposition of pigment in the skin and shanks of broilers. Furthermore, birds receiving diets containing the antioxidant were significantly heavier than the birds receiving diets containing no antioxidant, but utilization of feed was not affected by the addition of ethoxyquin to the feed.—Authors summary.

WANG, C. W.

A REPORT ON THE TEST OF DIETHYLSTILBESTROL IMPLANTATION ON POULTRY. Chinese Animal Husbandry Jour. 4: 219-223. 1958.—A series of tests were made by implanting hexoestrol tablets, capette pellets and diethyl-stilbestrol ampoules on chickens and ducks in 1957 and so far the results proved to be satisfactory. The tests were carried out in 4 groups, with all necessary relevant particulars being kept on record. It was concluded that the diethyl-stilbestrol implantation prepared in ampoules would be easily assimilated, and would in all cases produce a quickening effect on the growth of poultry. The carcase quality of the treated bird tastes tender and succulent. It was also proved that the fine, sleek and pointed feathers of the treated cock which remained unslaughtered after 6 weeks, would assume a dull colour and look like the hen's feathers being usually round and blunt in shape. The procedure for caponisation is simple and it will obviate the actual operation removing the testicles from the cocks, and hence it will ensure the live rate of the treated birds. The chemical method of caponisation can be extended in alleviating the pressure of oversupply of cockerels in early Autumn, and rendering a substantial help to improve the management of poultry stocks.—Courtesy Science Abstracts of China (Biological Abstracts)

WATANABE, TOHRU, T. NISHIDA, T. FUJIOKA, and M. YASUDA. (Nagoya U., Japan.)

COMPARATIVE AND TOPOGRAPHICAL ANATOMY OF THE FOWL. VIII. THE DISTRIBUTION OF THE NERVES TO THE HEAD AND NECK IN THE FOWL. 2. IN: PROCEEDINGS OF THE 47th MEETING OF THE JAPANESE SOCIETY OF VETERINARY SCIENCE. Japanese Jour. Vet. Sci. 21(6): 34-35. 1959.—Japanese abstract. (Biological Abstract)

WEISS, H. S., H. FISHER, and P. GRIMINGER. (Rutgers, State U., New Brunswick, N. J.)

CHEMICAL CONTROL OF ONSET OF EGG PRODUCTION. Poultry Sci. 39(5): 1221-1223. 1960.—The management procedure of retarding sexual maturity by restricting feed or light was simulated by feeding nicarbazin at 0.04% to 5-month-old White Leghorn pullets. This procedure delayed attainment of full egg production for 8-10 weeks. Body weight was maintained throughout, and by one month after withdrawl of the drug, production and egg weight were essentially normal and remained normal for the additional month that the birds were observed. The overall practicality of this technique in terms of the bird's complete productive life was not determined.—H. S. Weiss. (Biological Abstract)

WEISS, H. S. 1961. (Physiol. Lab., Dept. Poul. Sci., Rutgers, State U., New Brunswick, N. J.)

THE EFFECT OF RESERPINE ON IMMERSION HYPOTHERMIA IN THE HEN. *Poultry Sci.* 40 (1): 64-67.—White Leghorn hens were fed reserpine at the level of 1.6 mg/kg feed for 14 weeks. This treatment had essentially no effect on body weight, reproductive activity, blood pressure, pluse rate, or respiratory rate, but did depress body temperature a significant 0.6°C. The birds were then subjected to immersion hypothermia in a 15°C. water bath. By the mid-point in the exposure interval, the body temperature difference between treated and control birds had essentially disappeared. There were no significant differences in survival time, body temperature at death, or in rate of cooling.—Author's summary.

WENTWORTH, B. C. (U. Massachusetts, Amherst.)
FISTULATION OF HEN'S OVIDUCT. Poultry Sci.. 39(3): 782-784. 1960.—A technique was developed which allows successful and permanent fistulation of the hen's oviduct. Details are given of the procedure by which the infundibulum is removed and the anterior portion of the magnum is attached to the body wall musculature. A special polyethylene plug permits repeated access for experimental purposes.—W. J. Mellen. (Biological Abstracts)

WILCOX, F. H. (U. Maryland, College Park.)
EFFECT ON FERTILITY OF TEMPERATURE, HANDLING METHODS, LAKE'S SOLUTION AND THE ADDITION OF EGG WHITE, EGG YOLK, AND SUGARS TO THE DILUENT USED IN STORING CHICKEN SEMEN. Poultry Sci. 39(2): 459-467. 1960—Experiments conducted have shown the following influences on fertility from stored chicken spermatozoa: (1) Inconsistent effects of adding fructose, glucose, and egg white to a phosphate buffer containing antibiotics when used as a diluent in storage. On the average, fertility was improved with the following additives in order of increasing effectiveness: egg white (10%), fructose (4 mg/ml), and egg white combined with fructose. (2) Additions of egg yolk to the diluent or substitution of Lake's solution as a diluent resulted in marked lowering of fertility. (3) Substitution of Lake's solution for the buffer plus fructose for resuspending sperm after storage revealed no differences in feritlity. (4) A 1 to 2 dilution of semen provided no reduction in fertility after 8 hours storage but pronounced reduction in fertility after 2 days storage. A 1 to 10 dilution of semen followed by concentration also resulted in no reduction in fertility after 8 hours storage, but some reduction in fertility after 2 days storage. (5) Sorage of semen at 25°C resulted in low fertility as compared to 10°C. Storage at 2°C, resulted in lowered fertility only with the 1 to 2 dilution and not with the diluted and concentrated semen when compared to 10° C. (6) Hatchability data involving 6900 eggs were summarized from several reports, and show a slight decrease in hatchability with increasing storage time.—F. W. Wilcox. (Biological Abstracts)

WILSON, R. C., and L. M. HENDERSON.
NIACIN BIOSYNTHESIS IN THE DEVELOPING CHICK EMBRYO. *J. Biol. Chem.*, 1960, 235, 2099-2102. (Dept. Biochem., Oklahoma Agric. Exp. Stat., Stillwater.) (Nutrition Abstracts & Reviews)

WINNICK, R. E., and **THEODORE WINNICK.** (Weizmann Inst. Sci., Rehovoth, Israel.)
PROTEIN SYNTHESIS IN SKELETAL MUSCLE, WITH EMPHASIS ON MYOFIBRILS. *Jour. Biol.Chem.* 235(9): 2657-2661. 1960.—The rates of incorporation of labeled adenine into ribonucleic acid, and of C^{14}-labeled amino acids into the protein of skeletal muscle cell fractions in the chick, were determined under various conditions. The results support the view that a considerable proportion of the myofibrillar proteins was derived from the mitochondria and microsomes, but the possibility that the myofibrils participated in the protein synthesis was not excluded. A nucleoprotein fraction separated from valine-C^{14}-labeled myofibrils had an augmented concentration of isotonic amino acid.—T. Winnick. (Biological Abstracts)

WOLFE, H. R., W. J. MILLER, and **V. S. ASMUNDSON.** 1961. (U. Wisconsin, Madison, and U. California, Davis.)
ANTIBODY PRODUCTION OF PHEASANT-TURKEY HYBRIDS. *Poultry Sci.* 40(1): 140-144.—Turkeys, pheasants and hybrids of these were injected with bovine serum albumin. Following a primary inoculation, the hybrids responded much like pheasant but showed a later appearance for antibody. Only 2 of the 11 turkeys responded following a primary inoculation. A booster injection resulted in an increased production in the hybrids and turkeys but apparently not in the pheasants. The hybrids responded better to the booster injection than did either

parental species. However, it is emphasized that the bleeding times for antibody determinations were not made necessarily at th optimum time. Using a different test with lens antigen, the hybrids were also found to surpass the parental species.—Authors summary.

YASUDA, MIKIO, T. FUJIOKA, T. NISHIDA, and **T. WATANABE.** Nagoya, Japan.)

COMPARATIVE AND TOPOGRAPHICAL ANATOMY OF THE FOWL. XI. ON THE NERVOUS SUPPLY OF THE HIND-LIMB. IN: PROCEEDINGS OF THE 47TH MEETING OF THE JAPANESE SOCIETY OF VETERINARY SCIENCE. *Japanese Jour. Vet. Sci.* 21(61): 36, 1959.—Japanese abstract. (Biological Abstracts)

ZARROW, M. X., D. L. GREENMAN, and **L. E. PETERS.** 1961. (Dept. Biol. Sci., Purdue U., Lafayette, Indiana.)

INHIBITION OF THE BURSA OF FABRICIUS AND THE STILBOESTROL—STIMULATED OVIDUCT OF THE DOMESTIC CHICK. *Poultry Sci.* 40(1): 87-93.—Involution of the bursa of Fabricius and inhibition of stilbestrol-induced growth of the oviduct was used to test the effectiveness for the chick of steroids with known activity in mammals. Progesterone, 17-α- hydroxyprogesterone, hydroxycortisone acetate, 11-desoxycorticosterone acetate, 11-desoxy-17-hydroxycorticosterone, testosterone and ethinyl testosterone were effective inhibitors of stilbesterol-stimulated oviduct growth while cortisone acetate, 6-α methyl-17 α-hydroxyprogesterone acetate and both the caproate and acetate of 17α-hydroxyprogesterone were ineffective or only slightly active at the doses used. Cortisone, hydrocortisone, 11-desoxycorticosterone, corticosterone, 11-desoxy-17-hydroxycorticosterone, 6 methyl-1 α hydroxprogesterone acetate, 17 α-ethyl-19-nortestosterone, testoterone, and estradiol induced marked involution of the bursa of Fabricius, whereas progesterone , 17 α-OH progesterone, 17 α-OH progesterone caproate and 17 α-hydroxyprogesterone acetate were ineffective.—From authors summary.

NUTRITION

AMMERMAN, C. B., H. W. NORTON, H. M. SCOTT. (U. Illinois, Urbana), and **A. H. NESBIT.**

RAPID ASSAY OF INORGANIC PHOSPHATES FOR CHICKS. *Poultry Sci.* 39(2): 245-250. 1960.—A rapid assay of inorganic phosphorus supplement for chicks was developed and shown to have a high degree of sensitivity. The assay involved the use of day-old chicks subjected to a four-day phosphorus depletion period followed by a six-day phosphorus repletion period. The response (tibia ash) to graded levels of phosphorus from the phosphate supplements was compared with the NaH_2PO_4 reference standard. A modified assay technique, based on the original data, was proposed.—A. C. Ammerman. (Biological Abstracts)

ARAKAWA, SELJI, NOBORU TSURUMI, KATSUTOSHI MURAKAMI, SUSUMU MUTO, JO HOSHINO, and **TATSUJIRO YAGI.** (U. Tokyo,, Minatuku, Japan.)

EXPERIMENTAL BREEDING OF WHITE LEGHORN WITH THE CHLORELLA-ADDED COMBINED FEED. *Japanese Jour. Exptl. Med.* 30(3): 185-192. 1960.—*Chlorella* added to combined feed in a concentration of 10% supported the growth of hens. Eggs laid by the hens fed on the feed supplemented with *Chlorella* contained more pigment such as carotene and xanthophylls and vitamin A.—Minoru Matumoto. (Biological Abstracts)

ARSCOTT, G. H., R. J. ROSE, and **J. A. HARPER.** (Oregon State Coll., Corvallis.)

AN APPARENT INHIBITOR IN BARLEY INFLUENCING EFFICIENCY OF UTILIZATION BY CHICKS. *Poultry Sci.* 39(2): 268-270. 1960.—A 4-week experiment was conducted with broiler chicks fed rations containing corn; barley; barley-soaked (1/2 hour) and dried (24 hours); barley-autoclaved (1 hr. at 15 lbs. pressure) soaked and

dried; barley-soaked, autoclaved and dried; barley-soaked; dried and autoclaved; barley plus amylolytic enzyme and barley plus autoclaved mylolytic enzyme. Chick growth and dropping accumulation data show that autoclaving does not destroy the beneficial effects derived from soaking barley but does destroy the improvement attributed to an enzyme supplement. Water treatment of barley apparently removes an inhibitor or inhibitory action which can be overcome by an appropriate enzyme suplement.—G. H. Arscott. (Biological Abstracts)

ATKINSON, ROBERT L., and **FRANK H. KRATZER.** (U. California, Davis.)

EFFECTS OF UNIDENTIFIED FACTORS ON THE BODY AND SPLEEN WEIGHTS OF YOUNG CHICKS. *Poultry Sci.* 39(3): 631-637. 1960.—A study was made in order to obtain further information on the effects of unidentified growth factors in liver and other tissues (pancreatic and splenic) on the growth rate of young chicks and of the size of the spleen of chicks fed such substances, and to further study the stability of such factors to autoclaving at sexual pH's as well as to obtain information on the solubility of the factors in chloroform. Data obtained indicates the presence of 2 factors in liver L and one in splenic tissue. The 2 factors in liver L are described as a growth factor and a factor affecting the size of the spleen. The growth factor was stable to autoclaving at several pH's (1, 4, 7 and 9) and was found in both a free and bound farm. The bound farm was released by autoclaving at pH7 and pH9. The factor affecting the weight of the spleen was stable to atuoclaving and rendered partially soluble in chloroform after autoclaving at pH9.—Auth. summ. (Biological Abstracts)

BARUAH, J. N., R. E. DAVIES, B. L. REID, and **J. R. COUCH.** (Texas Agric. Expt. Sta., College Station.)

PHOSPHORUS AVAILABILITY FROM THE ASH OF UNIDENTIFIED FACTOR SOURCES. *Poultry Sci.* 39(4): 840-842. 1960.—The combined ash of 5 unidentified factor sources (dried whey, distillers dried solubles, fish solubles, alfalfa meal and dried brewers yeast) failed to influence the growth of chicks to 4 weeks, or the availability of phosphorus in colloidal phosphate as measured by bone ash determination. Colloidal phosphate in the diet depressed bone ash values without appreciably affecting growth rate.—J. B. Couch. (Biological Abstracts)

BARUAH, J. N., H. E. DAVIES, B. L. REID, and **J. H. COUCH.** (Texas Agric. Expt. Sta., College Station)

UTILIZATION OF PHOSPHORUS FROM DEFLOURINATED AND COLLOIDAL PHOSPHATE BY CHICKS AND LAYING HENS. *Poultry Sci.* 39(4): 843-849. 1960.—Use of colloidal phosphate in combination with dicalcium phosphate or deflourinated rock phosphate, to supply one quarter or one half of the added phosphate in chick diets resulted in good growth and feed efficiency. The chick did not require more than 0.63% total phosphorus (0.2%inorganic). Laying hens were not adversely affected by the use of colloidal phosphate to supply one-third or two-thirds of the total of 0.3% inorganic phosphorus added to the diet, although the higher level decreased feed efficiency slightly.—J. R. Couch. (Biological Abstracts)

BEARSE, G. E. (West. Washington Expt. Sta., Puyallup.), **C. F. McCLARY,** and **H. C. SAXENA.**

BLOOD SPOT INCIDENCE IN CHICKEN EGGS AND VITAMIN A LEVEL OF THE DIET. *Poultry Sci.* 39(4): 860-865. 1960.—Results of 3 experiments conducted with White Leghorn chickens involving the effect of feeding different levels of vitamin A on blood spot incidence in their eggs have shown the following: (1) blood spot incidence in eggs was increased at levels of vitamin A below 1100 U.S.P. units per lb. of feed; (2) vitamin A levels in the range of 1200-1600 units per lb. resulted in minimum blood spot incidence and no further reduction occurred with levels up to 15,000 units; (3) birds depleted of vitamin A reserves decreased in percent blood spots more rapidly when

fed diets containing 3600 and 10,000 units of vitamin A per lb. than when fed diets containing 2300 units per lb.—C. E. Bearse. (Biological Abstracts)

BELANGER, LEONARD F. (Sch. Med., U. Ottawa, Canada.), and **B. B. MIGICOVSKY.**

COMPARATIVE EFFECTS OF VITAMIN D, CALCIUM, CORTISONE, HYDROCORTISONE AND NORETHANDROLONE ON THE EPIPHYSEAL CARTILAGE AND BONE OF RACHITIC CHICKS. *Development Biol.* 2(4): 329-342. Illus. 1960.—Rachitic chicks were treated with vitamin D, calcium phosphate, cortisone, hydrocortisone, norethandrolone, or a combination of these factors. Vitamin D, norethandrolone, and calcium promote the maturation of cartilage matrix. Cortisone and hydrocortisone inhibit this process. Vitamin D and calicum promote the maturation of subepiphyseal bone cells and matrix. Norethandrolone promotes the growth of immature bone cells which secrete a small amount of matrix. Maturation of subepiphyseal bone is produced by the association of norethandrolone with calcium phosphate. The results support the thesis that vitamin D played a dual role in the body economy. It increases Ca absorption and at the same time stimulates the replacement and mautration of bone forming cells.—Authors. (Biological Abstrcats)

BERG, LAWRENCE R. 1961. (Wash. State U., Puyallup, Wash.)

EFFECT OF ADDING ENZYMES TO BARLEY DIETS AT DIFFERENT AGES OF PULLETS ON LAYING HOUSE PERFORMAMNCE. *Poultry Sci.* 40(1): 34-39.—The effect of adding a bacterial enzyme preparation to a diet containing barley for S. C. White Leghorn pullets at 0, 8 and 21 weeks of age on growth rate and subsequent laying house performance as well as adding the enzymes to barley diets when changing from a corn to a barley ration at 8 and 21 weeks was studied. The addition of the enzyme supplement to the diet containing barley increased growth rate to 8 weeks of age, but not from 8 to 21 weeks. There was some indication that the enzymes increased body weight gains during the laying period. There was no significant improvement in rate of lay, feed efficiency of egg production, egg weight, Haugh units, specific gravity of eggs, hatch of fertile eggs or livability of birds.

The use of enzymes in barley rations improved the condition of the litter on which the birds were reared to 21 weeks of age.—From author's summary.

BERZIN, JaM., A. R. VALDMAN, E.Ja. TAUCIN, JaJa ROZENBAH, and **A. B. SVILANE,** Rol mikroelementov v preduprezdenii rahita u cypljat.

ROLE OF TRACE ELEMENTS IN THE PREVENTION OF RICKETS IN CHICKENS. *Fiziol. Biohim. Pitan. sel'skohoz. zivotnyh, Akad. Nauk Latv. SSR, Riga, 1959, 157-161.*—The diet of chickens was of oatmeal, barley meal, wheatmeal, wheat offals, casein, baker's yeast, pine needles and salt, with bonemeal and mussel-shell meal varied at the expense of oatmeal. The 10 groups had Ca levels of 1.5, 2 5 or 3.7, and P usually 0.5 but in one group 1.0%. Different groups had the diets without or with vitamin D_3, 20 I.U. per 100 g diet, or supplements of Co, Mn or Zn. Groups were of 11 chickens and feeding tests lasted 35 days with a 3-day balance period starting on the 25th day for several groups.

Excess Ca, 3.7%, with low P depressed growth and mineralisation of bone even in presence of vitamin D, but more in its absence. With 2.5% Ca and 0.5% P but no vitamin D, added Mn, 9.9 mg per 100 g, or Zn, 12.12 mg per 100 g, depressed growth as much as excess Ca, and depressed mineralisation even more. Added Co, on the other hand, slightly improved growth but not mineralisation.

The depressing effect of Zn on mineralisation is contrasted with its value in counteracting the effect of excess Ca in parakeratosis of pigs. —D. Duncan. (Nutrition Abstracts & Reviews)

BOYD, JOSEPHINE, H. H. WEISER, and A. R. WINTER. (Ohio State U., Columbus.)

INFLUENCE OF HIGH LEVEL ANTIBIOTIC RATIONS WITH TEREPHTHALIC ACID ON THE ANTIBIOTIC CONTENT AND KEEPING QUALITY OF POULTRY MEAT. *Poultry Sci.* 39(5): 1067-1071. 1960.—High level (1000 g/ton) feeding of chlortetracycline (CTC) and oxytetracline (OTC) feeding to broilers and laying hens resulted in storage of the antibiotics in the serum, liver and dark and white meat. Feeding teraphthalic acid (TPA) at .05% level in the high level CTC and OTC rations resulted in about double the storage in the tissues. Feeding a low calcium ration during the time of use of high level CTC or OTC with TPA resulted in still greater storage in the tissues. High level CTC feeding with TPA resulted in longer keeping time of cut-up parts of chickens held at 35°.—A. R. Winter. (Biological Abstracts)

BRECHTER, C. L. Uber den Einfluss der Zufuhr verschiedener Fettarten auf das Serumcholesterin bei Hahnchen.

EFFECT OF DIFFERENT TYPES OF FEED FAT ON THE SERUM CHOLESTEROL OF COCKERELS. *Ztschr. Ernahrungswiss.*, 1960, 1, 111-118. (Med. Univ.-Klin., Lund.)—The cockerels, initially 9 weeks old, were in 3 experimental groups of 18 and a control group of 6. The control group were fed on the standard poultry feed which all had had before the experiment. The experimental groups received a semi-synthetic diet based on casein, wheat starch and sugars, with complete mineral and vitamin mixtures, in which the fat content in weeks 1 to 13, 14 to 25 and 26 to 36 was raised progressively, 10, 15 and 20%, at the expense of starch. For the 3 groups the fats used were maize oil, hardened coconut oil and butter.

The control group grew faster than the others, but stopped growing earlier, and at 36 weeks when all were killed there was little difference in mean weights, which were satisfactory in all groups. No macroscopically visible atheroma was found in any group. The birds given coconut oil or butter had higher serum cholesterol values than the others; the difference became significant when fat was increased from 10 to 15% of the diets. It is concluded that saturated fatty acids can produce high serum cholesterol values in birds not given a supplement of cholesterol. —D. Duncan. (Nutrition Abstracts & Reviews)

BRION, A., M. FONTAINE, and M. P. FONTAINE Quelques effets de la supplementation d'un aliment per des antibiotiques sur le metabolisme lipidique du poulet de chair.

EFFECT OF SUPPLEMENTING A FEED WITH ANTIBIOTICS ON LIPID METABOLISM OF TABLE POULTRY. *C.R. Acad. Agric.*, 1960, 46, 374-377 (with discussion 378-382).—There were 3 groups of 30 chickens; 10 of each group were killed at 8, 10 and 12 weeks. They were fed on the same balanced basal diet and for 2 groups penicillin 8 g or erythromycin 20 g per metric ton feed was added. There was no difference between groups in growth or feed required per unit weight gain. The antibiotics had no significant effect on total lipids or cholesterol in serum, cholesterol in arterial walls, or albumin or globulin fractions of serum protein, and produced no atherosclerotic lesion in aorta, coronary arteries or cerebral arterioles.—T. D. Bell. (Nutrition Abstracts & Reviews)

BRUGGEMANN, J., and J. TIEWS. Vergleichende Untersuchungen an Albinoratten und Huhnerkuken uber die Verwertung von Neo-(2-monocis) Vitamin A.

COMPARATIVE STUDIES ON UTILISATION OF *neo-* (2-MONO-*cis*) VITAMIN A BY ALBINO RATS AND CHICKS. *Internat. Ztschr. Vitaminforsch.*, 1960, 30, 279-305. (Inst. Physiol. Ernahrung Tiere, Univ. Munich.) French and English summaries.—*neo*Vitamin A alcohol and acetate were compared with vitamin A acetate and alcohol by use of 230 male rats and 245 male chicks. Rats about 3 weeks old and

day-old chicks were given a vitamin A deficient diet for from 14 to 21 days and from 12 to 18 days, respectively. Doses of each of the 4 preparations, estimated spectrophotometrically to have the relative magnitudes of 2 to 1, were given into the stomach on 3 successive days. There was one group given no vitamin A. The animals were killed 48 h after receiving the last dose. The livers were removed, vitamin A was extracted and the different forms were estimated by their respective spectral absorption maxima.

The mean amount stored of *neo*vitamin A in terms of all-*trans* vitamin A was for rats about 66% and for chicks about 50%. *neo*-Vitamin A given by mouth was transformed in the liver predominantly into all-*trans* vitamin A (so in original paper, corrected later (private communication) to "stored" in the liver predominantly as all-*trans* vitamin A"). When pure all-*trans* vitamin A was given, *neo*vitamin A might appear in the liver.—E. M. Hume. (Nutrition Abstracts & Reviews)

BRUGGEMANN, J., and H. ZUCKER. Wachstumsleistung von Kuken mit einer halbsynthetischen Diat.

GROWTH OF CHICKENS ON A SEMISYNTHETIC DIET. *Arch. Geflugelk.*, 1960, 24, 279-283. (Inst. Physiol. Ernahrung Tiere, Univ. Munich.) English summary.—Two groups of 40 Nichols-Lohmann day-old chicks were given a standard diet or a semisynthetic one of, per cent, glucose 40, isolated soya bean protein 35, refined soya oil 15, minerals 6, cellulose 2 and a preparation of vitamins, amino acids and antibiotic 2. Average weights of the trial group were, after 14, 28 and, for 10 chickens, after 42, 49 and 56 days, 239, 629 and 1133, 1336 and 1655 g; at 28 days feed eaten per kg gain was 1.35 kg; the group on the standard diet required 1.84 kg and weighed on average 590 g at that age.—R. G. Hankin. (Nutrition Abstracts & Reviews)

CALDWELL, C. T., and D. E. SUYDAM.

COMPARISON OF CHOLESTEROL AND ESTROGEN-INDUCED ATHEROSCLEROSIS IN COCKERELS. *Proc. Soc. Exp. Biol. Med.*, 1960, 104, 133-135. (Upjohn Co., Kalamazoo, Mich.)—Graded amounts of cholesterol given in a standard mash to chickens for 8 weeks produced progressively more atherosclerosis and higher serum cholesterol and phospholipid values. It was concluded that the best diet for producing high cholesterol values and plaques in main arteries in young cocekerels was one with 0.5% cholesterol given for 8 weeks. When an injection of 5 mg oestradiol was superimposed on the diet with cholesterol serum lipids rose further and plaque formation was more rapid. The extent of the rise of serum lipids did not determine the extent of atheroma.—D. Duncan. (Nutrition Abstracts & Reviews)

CLARY, PAUL D., ROBERT GORDON, DAVID SINGMAN, and SAMUEL LEPKOVSKY. U. California, Berkeley.)

STUDIES ON THE ALFALFA INHIBITOR. *Poultry Sci.* 39(2): 399-404. 1960.—This work confirms previous work that cholesterol inactivates the alfalfa inhibitor. Presumably cholesterol reacts with the alfalfa inhibitor (saponin?) to form an insoluble complex which remains intact in the gastrointestinal tract of chickens so that the alfalfa inhibitor cannot be absorbed or otherwise exert its growth-depressing activity. Alfalfa concentrates (about 50% solids) rich in saponins (determined by its hemolytic activity) have been prepared which do not depress the growth of chickens while similar dry preparations do depress growth. Water may partially or completely inactivate the alfalfa inhibitor in alfalfa concentrates or in alfalfa-containing feeds which are kept wet overnight and dried. The alfalfa inhibitor of such feeds is only partially inactivated. While alfalfa concentrates rich in saponins are devoid of growth-depressing activity when fed at low levels become toxic at high levels and at these levels cholesterol does not counteract its deleterious action. Alfalfa concentrates decrease the blood cholesterol levels of chickens fed a diet without cholesterol but when cholesterol is included in the diet, such concentrates increase blood cholesterol.—S. Lepkovsky. (Biological Abstracts)

COLUMBUS, A., and **G. GOBEL.** Der Einfluss eines Enzympraparates auf die Futterverwertung nach Versuchen an wachsendem Geflugel.
THE EFFECT OF AN ENZYME PREPARATION ON FEED UTILISATION IN TRIALS WITH GROWING POULTRY. *Jahrb. Arbeitsgemeinschaft Futterungsberatung,* 1958/1959, 2, 251-257.—Two groups of 56 White Leghorn chicks aged 4 days at the start were studied for 70 days in deep litter houses. They were fed on rearing meal, wheatmeal and greens; for one group the rearing meal contained 1% of the pancreatic enzyme preparation "Hoechst". Feeding was 6 times daily, with the rearing meal alone on 3 occasions and mixed with greens on a fourth. There was no significant effect of the enzyme preparation on weights at 10 weeks although it improved gains in the period from 2 to 6 weeks.—D. Duncan. (Nutrition Abstracts & Reviews)

COMBS, G. F., and **N. V. HELBACKA.** (U. Maryland, College Park.)
STUDIES WITH LAYING HENS. I. EFFECT OF DIETARY FAT, PROTEIN LEVELS AND OTHER VARIABLES IN PRACTICAL RATIONS. *Poultry Sci.* 39(2): 271-279. 1960.—Two experiments, each involving 32 pens of Single Comb White Leghorns, were conducted for 24 and 32 weeks, respectively. Rations were fed ranging from 14.6 to 19.1% protein and 909 to 1096 Calories of productive energy per pound with C/P ratios of from 54.6:1 to 66.6:1. Results revealed that a C/P ratio as wide as 66:1 was adequate to support 60% egg production. Layers permitted free-choice selection of feeds varying in protein level, selected rations with C/P ratios ranging from 56.6-62.1:1 with an average of 59.6:1. The addition of either 9% hydrolyzed animal and vegetable fat, 10% animal tallow, or 10% corn oil significantly increased egg size, but had little effect on other test criteria. Corn oil supplementation did increase the cholesterol per gram of yolk. Layers permitted free-choice selection of feeds varying in fat content consistently selected a ration which contained approximately 8% added fat. Additional choline supplementation to practical rations containing 10% added fat and approximately 600 mg of choline per pound was without effect. Zinc supplement was without benefit, except for a slight but significant increase in egg yolk lipids. The addition of 1.5% ammonium chloride did not adversely affect egg production during a 6-week period, but did reduce egg shell thickness.—G. F. Combs. (Biological Abstracts)

COMBS, G. F., B. GATTIS, and **C. S. SHAFFNER.** 1961. (Dept. Poul. Husb., U. Maryland, College Park)
STUDIES WITH LAYING HENS. 2. ENERGY RESTRICTION. *Poultry Sci.* 40(1) 220-224.—Two experiments have been conducted with Columbian Plymouth Rock and Maryland Flightless strain laying pullets in which intake of a modified feed was controlled so that energy intake, but not other nutrients, was restricted to 87 and 81% of *ad libitum* intake of controls. During a 9 month period the energy restricted hens showed little difference in egg production, Haugh unit scores, or mortality. Rate of increase of body weight and egg size was reduced when energy was restricted. Observation concerning blood serum cholestrol, carcass fat and moisture determinations are given.—Authors summary.

CREGER, C. R., R. H. MITCHELL, M. L. JONES, R. L. ATKINSON, J. H. QUISENBERRY, and **J. R. COUCH.** (A. and M. Coll. Texas, College Station.)
THE EFFECTS OF ORAL ADMINISTRATION OF DIETHYLSTILBESTROL AND DIENESTROL DIACETATE ON GROWTH RATE AND EFFICIENCY OF FEED UTILIZATION OF BELTSVILLE SMALL WHITE TURKEY BROILERS. *Poultry Sci.* 39(4): 1041-1045. 1960.—Incorporation of diethylstilbestrol in the diet of 10-week-old Beltsville Small White turkeys improved weight gains but did not improve efficiency of feed utilization. Incorporation of dienestrol diacetate significantly improved weight gains and feed efficiency. The addition of animal tallow to the diets did not influence weight gains unless fed in combination with one of the estrogens, however feed utilization was improved by the addition of animal tallow alone.—J. R. Couch. (Biological Abstracts)

CROWLEY, T. A., M. W. PASVOGEL, A. R. KEMMERER, M. G. VAVICH, and A. A. KURNICK. 1961. (Depts. Poul. Sci. and Agr. Biochem., U. Arizona, Tuscon.)

EFFECT OF SOFT PHOSPHATE AND DICALCIUM PHOSPHATE ON REPRODUCTIVE PERFORMANCE AND EGG QUALITY. *Poultry Sci.* 40(1): 74-80.—White Leghorn pullets (50/lot) were fed a practical basal diet containing 0.41% total phosphorus. The basal diet was supplemented with either soft phosphate, dicalcium phosphate or combinations of these ingredients to supply a total phosphorus level of 0.71%. One control lot received no supplemental phosphorus. The feeding of supplemental phosphorus did not improve either egg production or feed conversion, egg production declined sharply in high environmental temperatures, and hatchability of fertile eggs was not significantly affected Haugh units and incidence of blood spots were higher in birds fed the unsupplemented basal diet and the highest level of soft phosphate. Egg shell weight, 1% shell and shell index all declined during summer months. The phosphorus requirement of the laying hen for egg production, hatchability, egg weight and quality was no more than 0.41% total phosphorus —From authors summary.

CURLANIS, J., Z. RUSZCZYC, and J. PRES. Wplyw wysokosci dawki na strawnosc owsa u gesi.

THE EFFECT OF AMOUNT GIVEN ON THE DIGESTIBILITY OF OATS BY GEESE. *Rocz. Nauk rol.*, 1959, 74B, 477-483. (Kat. Zyw. Zwierzat, Wyzsza Szk. Roln., Wroclaw.) Russian and English summaries.—The effect of quantity of oats on the digestibility of organic matter, crude protein, crude fat and crude fibre by geese given from 50 to 300 g daily was studied. Digestibility was lowest with 50 g per day. There was no difference between 150 and 300 g. (From English summary.'—J. C. Rigg. (Nutrition Abstracts & Reviews)

DEMPSEY, ROBERT J., and PAUL E. SANFORD. (Kansas State U., Manhattan.)

EFFECT OF FEEDING VARIOUS ANTIBIOTICS ON THE HEMORRHAGIC CONDITION IN CHICKENS. *Poultry Sci.* 39(3): 691-696. 1960.—Three experiments were conducted using a standard corn-soybean oil meal ration, purified diets and both crude and crystalline antibiotics to determine the effect of feeding various antibiotics on the hemmorrhagic condition in poultry. It was observed that some of the antibiotic supplements fed at levels of 10, 100 and 200 grams per ton caused significant increases in hemorrhages. The interaction between crude antibiotics and the K. S. U. corn-soybean oil meal basal diet revealed significant increases in hemorrhages as compared with the same antibiotics in purified diets. Crystalline antibiotics caused significantly less hemorrhages than crude feeding grade antibiotics.—P. E. Sanford. (Biological Abstracts)

DILLER, E. R. (Lilly Res. Lab., Indianapolis, Indiana.), **C. R. ROSE, and O. A. HARVEY.**

EFFECT OF BETA-SITOSTEROL ON REGRESSION OF HYPERLIPEMIA AND INCREASED PLASMA COAGULABILITY IN THE CHICKEN. *Proc. Soc. Exptl. Biol. and Med.* 104(2): 174-176. 1960.—Six-week-old cockerels were housed in a broiler battery, and were allowed feed and water ad libitum during the experimental period. The birds were randomly divided into 5 diet groups: (1) broiler ration; (2) broiler ration plus 5% cottonseed oil (basal ration); (3) basal ration plus 1% cholesterol; (4) basal ration plus 1% cholesterol plus 4% sitosterol; (3-4) one-half group 3 placed on diet 4 at 4-week test period. Plasma lipid levels, cholesterol, and coagulation times were determined at 2-, 4-, and 6-week intervals. At the termination of the experiment, the aorta was removed and total cholesterol and lipids were determined. A cholesterol-induced hyperlipemia was prevented, or fully counteracted (reduced to normal levels), by feeding beta-sitosterol. The decreased plasma clotting times associated with a hyperlipemia returned to con-

trol levels when a normal lipid level was attained. An inverse relationship was demonstrated between plasma clotting time in the presence of Russell's viper venom and degree of lipemia. Addition of 74% beta-sitosterol to the diet prevented or reversed an increased lipid and cholesterol concentration in liver and aorta.—Authors. (Biological Abstracts)

DINNING, JAMES S. (U. Arkansas, Little Rock.)

RELATIVE EFFECTIVENESS OF B_{12} AND DIMETHYLBENZIMIDAZOLE B_{12}-COENZYMES IN THYMINE METHYL BIOSYNTHESIS. *Proc. Soc. Exptl. Biol. and Med.* 104(3): 431. 1960.—Vitamin B_{12} was more effective in stimulating conversion of formate to thymine methyl by chick bone marrow cells than was 5,6 dimethylbenzimidazole B_{12}-coenzyme.—Author. (Biological Abstracts)

DONALDSON, W. E. (U. Rhode Island, Kingston.), and **C. D. GORDON.**

THE EFFECT OF 3% ADDED ANIMAL FAT ON LAYING HEN PERFORMANCE. *Poultry Sci.* 39(3): 583-587. 1960.—In a 350 day test, 3% stabilized animal fat was substituted for 3% corn in a laying ration and fed to 17 breeding groups of 26 birds, which were randomly divided into 34 groups of 13 birds. Added fat did not affect hen-day egg production but depressed hen-housed production in birds with initial weights of more than 5 pounds (heavy breeds). Feed and energy consumption was increased and feed conversion was lowered in both heavy and light breeds when fat was fed. Added fat resulted in greater mortality and incidence of internal hemorrhage and obesity in heavy breeds. There were no effects on egg quality from fat feeding.—Auth. summ. (Biological Abstracts)

DONOVAN, G. A. (Chas. Pfizer and Co., Inc., Terre Haute, Ind.), **W. C. SHERMAN, K. E. PRICE,** and **J. H. HARE.**

THE INFLUENCE OF PERIODIC REMOVAL OF CALCIUM SOURCES FROM RATIONS OF CHICKENS ON GROWTH AND EGG PRODUCTION. *Poultry Sci.* 39(3): 750-756. 1960.—The effect on growing chickens of low-calcium diets was investigated. With dietary calcium levels ranging from 0.702% to 0.138%, half of the groups showed significant retardation of growth during the first 2 weeks, but significant retardation continued in only 2 groups in the second 2 weeks. Other low-calcium groups showed appreciable, but not significant, retardation of gain over the 4 weeks. There was no depression or only slight depression of feed utilization measured over 4 weeks. Bone ash percentages appeared to be affected only in the groups receiving 0.138% and 0.458% Ca. In another experiment a calcium level of 0.2% significantly depressed growth only when fed from 0 to 8 days and a significant effect did not carry beyond 3 weeks No diminution of weight gains was noted when the ration contained only 0.2% Ca from 0-2 or 0-4 days of age or during four- and eight-day intervals at stages from 4 to 8 weeks of age. There was no depression of growth when only 0.6% Ca was fed 0-2, 0-4, or 0-8 days for four- and eight-day intervals at later stages. Feed utilization was not significantly lowered by either level of restricted Ca in this experiment. Bone ash, determined at 57 days, was lowered only when Ca was reduced to 0.2% or 0.6% in the 8 days immediately preceding the determination. With laying hens, egg production was lowered about 10% on 0.119% Ca during a five-day experimental period, but this effect did not continue when a normal ration was resumed.—D. F. Chickester. (Biological Abstracts)

DOUGLAS, C. R., and **R. H. HARMS.** (Florida Agric. Expt. Sta., Gainesville.)

EFFECTS OF VARYING PROTEIN AND ENERGY LEVELS OF BROILER DIETS DURING THE FINISHING PERIOD. *Poultry Sci.* 39(4): 1003-1008. 1960.—Experiments conducted with broilers maintained on the floor indicated that lowering the protein level in the diet, when broilers were 5 weeks old, while either increasing or holding energy level constant, had no significant effect on growth. Increasing the level of energy in the feed while holding protein level constant also failed to

give a consistent improvement in growth. Significantly heavier broilers were always produced by feeding, during the entire growing period, a diet containing 25% protein with 1150 calories of productive energy per pound. It appears that a level of 950 calories of productive energy per pound of feed is not high enough for maximum chick growth. Feed required per unit gain was largely affected by the energy content of the starter and finisher diets.—C. R. Douglas. (Biological Abstracts)

ENGELMANN, C. Weitere Versuche uber die Futterwahl des Wassergeflugels. Uber die Schmeckempfindlichkeit der Ganse.

FURTHER TRIALS ON CHOICE OF FEED BY WATER POULTRY. TASTE SENSITIVITY OF GEESE. *Arch. Geflugelzucht Kleintierk*, 1960, 9, 91-102. (Inst. landwirtsch. Versuchs- Untersuchungswesen, Rostock.) Russian and English summaries.—Two geese 2 years old and four 2 months old were offered a choice of water and solutions of NaCl, $MgCl_2$ or HCl. Water was preferred to solutions of 0.06, 0.06 and 0.009 M or above and solutions of more than 0.5, 0.48 and 0 05 M were refused. A 0.2M solution of cane sugar was slightly more and one of 0.5 M slightly less acceptable than water; the difference was not significant. The taste sensitivity of geese seemed to be better than that of hens and ducks and only slightly inferior to that of pigeons (*Ztschr. vergl. Physiol.*, 1934, 20, 626 and *Ztschr. Tierpsychol.*, 1950, 7, 84). For other work with geese see Abst. 3405, Vol. 29.—R. G. Hankin. (Nutrition Abstracts & Reviews)

EVANS, ROBERT JOHN, SELMA L. BANDEMER, and J. A. DAVIDSON.

FATTY ACID DISTRIBUTION IN LIPIDES FROM EGGS PRODUCED BY HENS FED COTTONSEED OIL AND COTTONSEED FATTY ACID FRACTIONS. *Poultry Sci.* 39(5): 1199-1203. 1960.—Mixed cottonseed oil fatty acids were separated into 7 fractions by crystallization from acetone in the cold. Each of these fractions and crude cottonseed oil were fed to groups of laying hens, and the eggs were stored at 0°C for almost one year. Egg oil from each group of hens was transmethylated and the fatty acid composition determined by gas-liquid chromatography. The fatty acid compositions of each cottonseed oil fatty acid fraction and of the basal ration lipides were also determined. Egg lipides contained a higher concentration of stearic acid than did dietary lipides. Supplementing the diet with small amounts of fatty acids to change the levels of the fatty acids in the rations of the hens did not increase the levels of these fatty acids in the egg oil very much. —R. J. Evans. (Biological Abstracts)

FANGAUF, R., H. VOGT, and W. PENNER. Senkung des tierischen Eiweissanteiles im Kukenfutter durch einen Alpha-Aminobuttersaure-Zusatz.

REDUCTION OF THE ANIMAL PROTEIN PORTION OF CHICK FEEDS BY ADDITION OF α-AMINOBUTYRIC ACID. *Arch. Geflugelk.*, 1960, 24, 275-278. (Lehr- Versuchsanst. Kleintierzucht, Kiel-Steenbek.) English summary.—Groups of New Hampshire day-old chicks were given for 8 weeks a feed mixture with 6% cod meal or a similar feed with 3% cod meal alone or with 0.1, 0.2 or 0.3% α-amino butyric acid in a preparation containing an equal amount of salt. Vitamins and antibiotic were added to all diets. Total weight gains for the 5 groups were 615, 582, 629, 636, 623 g and kg total nutrients per kg gain were 2.01, 2.19, 2.05, 2.12, 2.22. It is considered that the salt had a negative effect on the results, especially on feed conversion.—R. G. Hankin. (Nutrition Abstracts & Reviews)

FEATHERSTON, W. R., and E. L. STEPHENSON. (U. Arkansas, Fayetteville.)

DIETARY INTERRELATIONS BETWEEN METHIONINE, GLYCINE, CHOLINE, PROTEIN LEVEL AND ENERGY CONTENT OF THE CHICK DIET. *Poultry Sci.* 39(4): 1023-1029. 1960.—The dietary interrelationships between methionine, glycine, choline, protein

level and energy level were studied. In one feeding trial the data suggested that the response to glycine was conditioned by the amount of choline in the diet. This was not repeated in later work. Significant growth responses were obtained by the addition of methionine and fat, and a significant interraction was noted between these 2 additives. A 21% protein diet produced chick weights which were significantly greater than those produced by the majority of diets which contained 18 and 24% protein.—E L. Stephenson. (Biological Abstracts)

FISHER, H., and **A. S. FEIGENBAUM.** (Rutgers U., New Brunswick, New Jersey.)
ESSENTIAL FATTY ACIDS OF NORMAL AND ATHEROSCLEROTIC AORTAS FROM CHICKENS RECEIVING DIFFERENTLY SATURATED FATS FOR THREE YEARS. *Nature* 186-(4718): 85-86. 1960. (Biological Abstracts)

FISHER, H., P. GRIMINGER, G. A. LEVEILLE, and **R. SHAPIRO.**
QUANTITATIVE ASPECTS OF LYSINE DEFICIENCY AND AMINO ACID IMBALANCE. *J. Nutrition*, 1960, 71, 213-220. (Dept. Poultry Sci., Rutgers Univ., New Brunswick, N. J.)—In 2 trials lasting 14 days, groups of 7 male chickens 1 week old were given diets with 11 to 26% protein; lysine was 2.7% of the protein, which was supplied as sesame meal. In other groups, lysine was added to supply up to 7.5% of the protein. A mixture of essential amino acids, adequate for growth if lysine were addded, depressed growth when added to form 4% of the ration except where lysine was almost optimum. Depressions were small at lowest lysine levels, with which growth was poor

In further trials, with 11% protein of which lysine formed 5.1% growth was reduced by glutamate, leucine, zein, a mixture of non-essential amino acids and the original mixture; with 7% lysine growth was decreased by leucine, glutamate, and the non-essential mixture but was increased by zein, and the essential mixture. With 23% protein, and 4% lysine results were similar but with 7% lysine the non-essential mixture increased growth and the essential mixture had no effect.

Feed consumption was reduced by imbalance or by lowering of protein content.—J. C. Rigg. (Nutrition Abstracts & Reviews)

FISHER, HANS, R. SHAPIRO, and **P. GRIMINGER.** (Rutgers State U., New Brunswick, N. J.)
FURTHER ASPECTS OF AMINO ACID IMBALANCE, WITH SPECIAL REFERENCE TO THE HIGH ARGININE REQUIREMENT OF CHICKS FED CASEIN DIETS. *Jour. Nutrition* 72(1): 16-22. 1960.—Three trials with week-old chicks were carried out to elucidate aspects of amino acid and imbalance. Addition of an amino acid mixture lacking in several essential amino acids to a balanced low-protein diet induced an imbalance which was gradually overcome at higher protein levels even when the amount of the amino acid mixture added remained constant at a percentage of the protein. The factorial suplementation of peanut protein at 12 and 24% of the diet with its 2 limiting amino acids, methionine and lysine, resulted in improved growth at the 12% protein level only when methionine was added. No effect was observed when lysine was added at this protein level. At the 24% protein level, a slight growth depression occurred upon the addtion of methionine alone, while a large response was obtained from lysine alone and the addition of both amino acids improved growth still further. This differenital response at the 2 protein levels can be explained in terms of the relatively greater methionine requirement for maintenance at the low protein level versus a relatively higher lysine to methionine ratio required for rapid growth at the high protein level. The high arginine requirement of chicks fed casein-containing diets may be explained in part by the relative excess of amino acids in casein protein when the latter is calculated to contain 16% of nitrogen. Supplementing 15% isolated soybean protein with the amino acids making up the difference between 20% casein protein (N x 6.5) and the 15% soybean protein

depressed growth using the latter diet which contained 1.24% arginine this depression was overcome by adding more arginine. The implications of these experiments in terms of amino acid imbalance are discussed.—Authors. (Biological Abstracts)

FONTANELLI, E. Sulfamidici, e antibiotici negli allevamenti avicoli. SULFONAMIDES AND ANTIBIOTICS FOR FEEDING POULTRY. (Spanish, English and German summ.) *Zooprofilassi* 12(2): 101-104. 1957.—The author discusses the importance of the use of antibiotics in the feed of table poultry and emphasizes some drawbacks.—Author. (Biological Abstracts)

FOX, M. R. SPIVEY, and G. M. BRIGGS. (Natl. Insts. Health, Bethesda, Md.)
SALT MIXTURES FOR PURIFIED-TYPE DIETS. III. AN IMPROVED SALT MIXTURE FOR CHICKS. *Jour. Nutrition* 72(2): 243-250. 1960.—A salt mixture for chicks was designed (1) to provide inorganic elements in only moderate excess of the requirement and (2) to minimize destruction of dietary constituents. The final mixture, Salts N, supported excellent growth of female New Hampshire chicks from one day to 4 weeks of age when the salt mixture was present at a level of 6% in adequate casein-gelatin or soybean protein diets. Each type of diet was fed with 4 and 16% levels of fat; a 9% level of Salts N was also fed in each type of diet. Growth was not improved with either type of complete diet by supplements of molybdenum or selenium; these elements are recommended as optional trace elements for the "moderately purified" experimental diets in current use. The requirement for Mg was less than that recommended by the National Research Council. In a simplified diet mix, the time required for rancidity to occur was 10 times longer with Salts N than with Salts A, previously used in this and other laboratories. Salts N did not accelerate the Maillard-type of browning in glucose-glycrine mixtures or in complete diets containing varying quantities of free amino acids. The iodine in potassium iodate and the selenium in sodium selenite were stable in Salts N.—Authors. (Biological Abstracts)

FRANK, F. R., and P. E. WAIBEL. (U. Minnesota, St. Paul.)
EFFECT OF DIETARY ENERGY AND PROTEIN LEVELS AND ENERGY SOURCE ON WHITE LEGHORN HENS IN CAGES. *Poultry Sci.* (39(4): 1049-1056, 1960.—White Leghorn hens in cages were fed diets containing 10.2, 12.4, 14.9, 19.9, and 29.9% protein. With low and high energy diets, 12.4 and 14.9% protein respectively, resulted in adequate egg production. Hens fed high energy diets were fatter and showed higher serum cholesterol levels than hens fed low energy diets. Protein level did not appear to affect these measurements. Hens receiving 10% bleachable fancy tallow, beef tallow, hog grease, corn oil, or safflower oil showed greater depot and carcass fat than hens receiving a corn-soybean meal-type diet or a modification containing 40% oats. At 10 weeks, groups receiving the vegetable oils showed higher cholesterol values than the non-fat or animal fat supplemented groups, while at 20 weeks the animal fat-fed groups showed cholesterol values greater than the no-added-fat or vegetable oil groups.—P. E. Waibel. (Biological Abstracts)

FRIDLIAND, I. B.
LIPID METABOLISM IN THE LIVER AND THE EFFECT OF GLUTATHIONE ON THIS PROCESS DURING EXCESSIVE INTAKE OF CHOLESTERIN IN THE DIET. *Biul. Eksptl. Boli. i Med.* (Trans.) 46(11): 1339-1341. 1958.—Chicks fed for 11 days with finely chopped green grass and millet porridge with 1% cholesterin and 2.5% of sunflower seed oil, developed liver hypertrophy. The content of water in the liver, as well as of the lecithin + cephalin and sphingomyelin decreased, while the total content of the lipids increased. Daily administration of 1 ml of 1% glutathione solution markedly reduced these disturbances.—Author. (Biological Abstracts)

FULLER, H. L., R. C. FIELD, R. RONCALLI-AMICI, W. S. DUNAHOO and **H. M. EDWARDS, Jr.** 1961. (Div. Poul. Husb., U. Georgia, Athens, Georgia.)

THE VITAMIN B_6 REQUIREMENT OF BREEDER HENS. *Poultry Sci.* 40(1): 249-253.—The vitamin B_6 requirement of breeder hens was studied in two experiments using S. C. White Leghorn hens in individual laying cages. The hens were artificially inseminated with pooled semen for hatchability studies. Using a purified soy protein-cerelose diet of known vitamin B_6 content supplemented with pyridoxine HCl at various levels, the minimum requirement for egg production was shown to be approximately 2.3 mg. and for hatchabaility, approximately 4.3 mg. per kg. of diet. Supplementing a corn-soy type diet containing an estimated 5 mg./kg. with pyridoxine HCl did not improve egg production or hatchability in one trial. The vitamn B_6 content of eggs was directly related to the level in the diet up to 3 mg. (added) per kg. beyond which no increase occurred. At this dietary level, eggs contained approximately 5 mcg. of vitamin B_6 per gm.—Authors summary.

GARDINER, E. E., J. C. ROGLER, and **H. E. PARKER.** (Purdue U., Lafayette, Ind.)

MAGNESIUM REQUIREMENT OF THE CHICK. *Poultry Sci.* 39(5): 1111-1115. 1960.—Two experiments were conducted to determine Mg requirements of chicks. Weight and mortality data indicated that the effects were noted with dietary Mg levels as high as 4058 ppm. Deficiency symptoms included poor growth, nervous tremors, gasping and convulsions. Deficiency symptoms occurred in 3 days when day-old chicks were fed diets extremely deficient in Mg. A direct relationship was observed between the level of dietary Mg and the plasma Mg level. The plasma cholesterol levels of birds on Mg deficient diets were lower than the plasma cholesterol levels on diets adequate in Mg.—E. E. Gardiner. (Biological Abstracts)

GASSNER, F. X., E. G. BUSS, M. L. HOPWOOD, and **C. R. THOMPSON.** (Colorado State U., Ft. Collins.)

EFFECT OF FEEDING 1, 2-DIHYDRO-6-ETHOXY-2,2,4-TRIMETHYLQUINOLINE TO CHICKENS. *Poultry Sci.* 39(3): 524-533. 1960.—The compound was fed in graded single doses to White Leghorn chicks both on and off feed in amounts up to 10 g/kg body weight. The LD_{50} at 24 hours was about 10 g/kg body weight off feed and between 8 and 10 g/kg body weight on feed. Chronic toxicity studies with graded levels up to .075% of antioxidant in the diet showed no significant effect on growth, feed consumption, livability, egg production, fertility of eggs or hatchability of eggs. Studies on male fertility and its duration were inconclusive. Progency from birds raised on the antioxidant-containing diets also showed no effect of treatment on growth and livability. Histological examination of liver, spleen, kidney, ovary, oviduct and thyroid of hens showed no changes correlated with treatment. Tissues of cockerels showed neither gross- nor micro-pathology which could be ascribed to the treatment. However, testes of birds on the 2 higher levels of antioxidant were larger than those of the control birds. Thyroids of all treated cockerels were smaller than those of the control birds.—Auth. summ. (Biological Abstracts)

GEBHARDT, G., W. HOLZSCHUH, and **D. PATZSCHKE.** Mastversuche mit Junggeflugel.

FATTENING TRIALS WITH YOUNG POULTRY. *Jahrb. Arbeitsgemeinschaft Futterungsberatung.* 1958/1959, 2, 225-236.—In a trial lasting 9 weeks 4 groups of 140 White Leghorn broilers were given a basal diet supplemented with Deltapen 3% without or with a supplement of vitamin A 8000 I.U. per kg and terramycin 2 g per 100 kg, the basal diet, or the basal diet supplemented with Microvitan 3%. Deltapen contained penicillin 0.5 g, vitamin B complex, vitamin B_{12}, and vitamin D_3 10,000 I.U. per kg; Microvitan contained P_2O_5 12, Al_2O_3 15%,

micronin 15 mg, vitamin B_{12} 700 μg, vitamins A and D_3 each 80,000 I.U. per kg and vitamins of the B complex, K and E and trace elements. The diets contained, per cent dry matter, crude protein 26.8, 26.6, 27.5, 27.1; crude fat 5.1, 7.2, 7.3, 6.9; fibre 5.1, 5.2, 5.4, 5.4; N-free extract 57.1, 55.0, 52.9, 53.5 and ash 6.0, 6.0, 6.8, 7.0. Gains were 566, 808, 498 and 817 g. Feed per kg gain was 6.9, 4.1, 8.4 and 4.1 g. Losses were 70, 17, 64 and 12 chickens. In a trial with rats true protein was 78.2, 78.0, 78.6 and 78.7% of crude protein; biological value was 67.6, 67.4, 65.3 and 65.3%.

In a second trial of 10 weeks with groups of 130 chickens there was a similar basal diet except that crude fat was 4%. Supplements were cod liver oil emulsion 3%; Deltapen 3% and vitamin A 8000 I.U., D_3 20,000 I.U., terramycin 0.02 g per kg; the same without Deltapen; and germinated grain. Gains were 823, 772, 806 and 596 g; feed per kg gain was 4.7, 48, 4.5 and 8.4 kg. Losses were 30, 27, 18 and 63 chickens.

In an 11-week trial with groups of 130 chickens, supplements were Microvitan 5%; the vitamin and terramycin supplement; vitamins only; and cod liver oil emulsion 6%. Feed per kg gain was 6.4, 5.2, 5.6 and 5.8 kg. Since the first experiment the Microvitan had been kept for 9 months.

In a 10-week trial with groups of 94 chickens, White Leghorns gained 790 g with Microvitan 3% and 957 g with Deltapen 2.5%; White Plymouth Rocks gained 922 and 988 g, respectively. Feed per kg gain was 5.0, 5.9, 4.8 and 4.3 kg. Losses were 19, 27, 14 and 24.

Carcasses from all groups were analysed and compared with day-old chickens. In the first trial, broilers receiving Deltapen, vitamin A and terramycin had best quality: in the second, germinated grain gave poor carcases; in the third, terramycin improved quality; Plymouth Rocks gave better quality.—J. C. Rigg. (Nutrition Abstracts & Reviews)

GILBREATH, J. C., Q. B. WELCH, R. E. WAGGONER, and **R. D. MORRISON.** (Oklahoma State U., Stillwater.)
THE EFFECT OF TRIFLUOPERAZINE AND RESERPINE ON REPRODUCTIVE EFFICIENCY IN CHICKENS. *Poultry Sci.* 39(3): 735-739. 1960.—Twenty-four pens of 20 Leghorn strain-cross pullets per pen made up this study. Six treatments with 4 replicants per treatment were used. Treatments used were control, 1.5, 2.0, and 2.5 mg of reserpine per kg of diet and 153.4, and 306.7 mg of trifluoperazine per kg of diet. Reserpine-treated birds response was not significantly different from controls possibily due to the fact that the pullets were never under naturally occurring thermal stress typical of this area When compared with controls, the pullets receiving trifluoperazine consumed less feed and produced eggs more efficiently. Also, mature body weight was attained earlier by these birds; however, differences in body weight between control and treatment birds during the latter periods of the study were near significance. Egg weight and shell thickness appeared to be negatively influenced by this drug.—Authors (Biological Abstracts)

GOBEL, G. Die Verwendung von Rapsextraktionsschrot im Legemehl.
THE USE OF RAPESEED OILMEAL IN LAYING MEAL *Jahrb. Arbeitsgemeinschaft Futterungsberatung,* 1958/1959, 2, 205-211.—Two groups of 30 laying hens were studied for a year. In the diet of one group 20% fishmeal provided somewhat more than half the total digestible crude protein, and the diet of the other had 15% fishmeal and 10% rapeseed oilmeal to provide a similar amount of protein. The laying meal was given freely from self-feeders, and in addition the hens of both groups had an evening feed of barley and oats each 20 g. Green kale was available in winter and a pasture run in summer. Digestibility trials were made wtih 2 hens of each group.

There was little difference in digestibility of the 2 laying meals; that containing rapeseed meal showed slightly greater digestibility of crude fat and slightly less of fibre and N-free extract. Total egg yields were 5334 without and 5170 with rapeseed meal at a cost of 797.95 and 762.99 kg total nutrients. In N balance trials biological

value of the protein of the two laying meals was 73.42 and 75.24%, respectively for pairs of pullets aged 9 to 10 weeks.—D. Duncan. (Nutrition Abstracts & Reviews)

GODSELL, T. E.

LINEAR PROGRAMMING AND POULTRY FEEDING. *Brit. Poultry Sci.*, 1960, 1, 57-63. (Dept. Agric. Econ., Univ. Bristol.) French and German summaries.—An example is given of the application of linear programming techniques for the calculation of least-cost feed mixtures for laying hens, subject to the provision of a minimum crude protein content, a maximum crude fibre content, and sufficient animal protein to satisfy vitamin B_{12} requirements. Simple graphical methods are used, rather than algebraic ones, to obtain the solutions.—I. McDonald. (Nutrition Abstracts & Reviews)

GORDON, RICHARD S., and **LAWRENCE J. MACHLIN.** (Monsanto Chem. Co., St. Louis, Missouri.)

A METHOD OF EVALUATION OF ANTIOXIDANTS BASED ON VITAMIN A PROTECTION. *Poultry Sci.* 38(6): 1463-1467. 1959. —An in vivo vitamin A protection test was found to be a sensitive and simple method of evaluating relative activities of different antioxidants. The test is conducted by placing day-old chickens on a purified depletion diet containing no supplemental vitamin A. Seven to 10 days later the birds are placed on the test supplements for 21 day growth period. All surviving birds are returned to the depletion diet for an additional 14 days. The criteria used are growth and survival. Using this procedure it was found that Ethoxyquin was superior to BHT (2,6,ditertiary-butyl-P-cresol) for the preservation of vitamin A for the growing chicken. It is suggested that the dietary requirement for vitamin A be reevaluated in the presence of effective antioxidants.—R. S. Gordon. (Biological Abstracts)

GOWE, R. S., A. S. JOHNSON, R. D. CRAWFORD, J. H. DOWNS, A. T. HILL, W. F. MOUNTAIN, J. R. PELLETIER, and **J. H. STRAIN.**

RESTRICTED VERSUS FULL-FEEDING DURING THE GROWING PERIOD FOR EGG PRODUCTION STOCK. *Brit. Poultry Sci.*, 1960, 1, 37-56. (Res. Branch, Canada Dept. Agric., Ottawa.) French and German summaries.—Experiments were on 6 farms with over 11,000 spring-hatched day-old Single Comb White Leghorn chicks of many genetic constitutions. On each farm the birds were reared together to 40 to 56 days of age. Genetically similar groups were transferred to grass range. After a preliminary period of 1 or 2 weeks during which both groups were allowed to feed to appetite, one group continued to do so, and the other was restricted to 70% of that amount. Both groups at first received grit and oyster shell to appetite but later, to stop excessive consumption by the restricted group, their intake was limited to that of the full-fed birds. This continued until 146 days of age. At 147 days both groups were penned, fed to appetite and given a minimum of 13 h light per day until the end of the trial at 500 days. The feed was given as dry mash throughout.

Mortality during rearing was high in the restricted groups on 5 farms, average on all 5.3% compared with 1.9% in the full-fed groups. Between 147 and 500 days the restricted group averaged 0.4 egg more per bird surviving to 500 days. Differences between farms were significant but those between full-fed and restricted groups were not. On a hen-housed basis production was 1.1 eggs more per restricted bird. The restricted birds reached sexual maturity 12 days later than the full-fed. Mean egg sizes at maturity were not significantly different.

Mortality during the laying period was 12.4 and 13.1% for restricted and full-fed birds, respectively, but there was little evidence of any real difference in age at death. At 147 days liveweight of restricted birds was 288 g less; the difference had fallen to 45 g by about 320 days.

Rearing costs were less for the restricted group: costs in the laying house were greater, egg production was better and return higher.—J. G. Gordon. (Nutrition Abstracts & Reviews)

GRANT, C. L., R. C. RINGROSE, and R. DOWNER.

TRANSFER OF DIETARY NONRADIOACTIVE STRONTIUM FROM HEN TO CHICK. *J. Biol. Chem.*, 1960, 235, 2157-2159. (Eng. Exp. Stat., Univ. New Hampshire, Durham.)—The ash of egg shells from hens given New England College Conference Breeder ration containing 0.038% Sr was found to contain 0.049± 0.020% Sr; the ash of chicken bones contained 0.040 ± 0.012% Sr. When the hens were given the same ration with strontium nitrate added to give 0.2% Sr, the amount in shell ash increased 40- to 50-fold within 3 days or less and remained constant thereafter. After 20 or 40 days when the hens were returned to the control ration it decreased steadily and after 50 days was about 2½ times normal. Chicks hatched from eggs containing large amounts of Sr were able to metabolise appreciable amounts of the element and the Sr content of the ash of their bones decreased to normal in 2 months or less, through elimination and dilution caused by rapid growth. Sr : Ca ratios showed that there was no discrimination against Sr between the feed and the hen's eggs; the results also suggested that the chick embryo displays some selectivity for Sr over Ca.—G. F. Garton. (Nutrition Abstracts & Reviews)

GREENE, D. E., H. M. SCOTT, and B. CONNOR JOHNSON. U. Illinois, Urbana.)

A NEED FOR GLYCINE IN CRYSTALLINE AMINO ACID DIETS. *Poultry Sci.* 39(2): 512-514. 1960.—Chicks fed a crystalline amino acid diet capable of sustaining a growth rate of approximately 13 grams per day during the 2d week of life were shown to require dietary glycine. Maximum weight gain, efficiency of feed utilization and N retention occurred when the diet contained 2.0% glycine.—D. E. Greene. (Biological Abstracts)

GRIMINGER, P., and H. FISHER.

GRAIN OR MASH FOR THE DAY-OLD CHICK? *New Jersey Agric. Exp. Stat. Bull.* No. 793, (1960), pp. 8.—In 2 trials day-old chicks were fed on mash, or on whole grain, wheat 35 and maize 65%, for the first 3 days. Growth to 28 days was less when grain had been given, and there was no effect on absorption of yolk. There was some pasting of the vent on all-mash rations, but this did not seem to affect growth to 28 days.

In a third trial groups of day-old chicks were given mash for 28 days, or grain for 1, 2 or 3 days at the start. Again it was seen that growth was less when grain was given; the depression seemed to be related to the length of time that grain was given. It is suggested that the grain did not supply enough protein, or protein of good enough quality.—T. D. Bell. (Nutrition Abstracts & Reviews)

GRIMINGER, P., and H. FISHER. (Rutgers U., New Brunswick, N. J.)

A PIGMENTATION ENHANCING EFFECT OF 2-METHYL-1,4 NAPHTHOQUINONE IN GROWING CHICKENS. *Poultry Sci.* 39(3): 706-707. 1960.—Chicks were fed starter rations supplemented with menadione, 5 g/kg, menadione sodium bisulfite complex, 15 g/kg, and santoquin, 0.5 g/kg. Compared with chicks fed an unsupplemented control ration, the menadione-fed chicks had appreciably darker shanks and beaks. The pigmentation effect was less pronounced with the other 2 compounds used. Pigmentation was both scored visually, and expressed in density readings per unit of dried skin after extraction with ethanol-chloroform. The level of menadione used had a growth-depressing effect. —P. Griminger. (Biological Abstracts)

GUTTRIDGE, D. G. A.

DRIED GRASS MEAL IN PRACTICAL BROILER DIETS. *Brit. Poultry Sci.*, 1960, 1, 69-72. (Poultry Dept., Kesteven Farm Inst., Grantham, Lincolnshire.) French and German summaries. — Intensively reared chickens given a diet without grassmeal grew significantly faster up to 42 days of age than similar chickens given a similar diet with maizemeal and soya bean oilmeal replaced by 2.5% dried grassmeal. Up

to 70 days of age there was no significant difference between the chickens on the different diets.—J. G. Gordon. (Nutrition Abstracts & Reviews)

HAENEL, H., E. GERRIETS, W. MULLER-BEUTHOW, and **B. GASSMANN.** Futterungsversuche mit hohen Dosen von Tetracyclin (Achromycin) an Huhnerkuken.

FEEDING TRIALS WITH LARGE DOSES OF TETRACYCLINE (ACHROMYCIN) FOR CHICKENS. *Arch. Geflugelk.*, 1960, 24, 217-237. (Inst. Ernahrung, Potsdam-Rehbrucke.) English summary.—Groups of 100 day-old Rhode Island Red chicks were given for 8 weeks broiler rations without achromycin or with 10, 50, 500, 750 or 1000 p.p.m. The largest amounts, given to test possible toxicity and the effect on intestinal flora, were not recomemnded for practical use. Vitamins D_3, A and E were supplied from the second week. Caecal coccidiosis occurred in all groups in the fourth week. Achromycin at all, especially the highest, levels increased feed intake, weight gains and feed efficiency and reduced disease and death rates but did not affect weight or vitamin B content of liver. The total number of micro-organisms in small intestine and caecum and the individual types found were about the same in all groups but more urea-positive bacteria occurred in small intestine and clostridia were absent when large amounts of achromycin were given.

There are 77 references.—I. R. Anderson. (Nutrition Abstracts & Reviews)

HEGSTED, D. M., A. GOTSIS, and **F. J. STARE.**

THE INFLUENCE OF DIETARY FATS ON SERUM CHOLESTEROL LEVELS IN CHOLESTEROL-FED CHICKS. *J. Nutrition*, 1960, 70, 119-126. (Dept. Nutrit., Harvard Sch. Pub. Health, Boston, Mass.)—Day-old cockerels were given a starter mash for 3 to 7 days before being divided into groups of 6 according to weight. They were then given for 3 weeks a purified diet containing 10% of test fat. Samples of blood were withdrawn weekly. In the first experiment there were 4 main groups given triolein, coconut or safflower oil or both oils. Each group was divided into 3 subgroups given 0.2, 0.4 or 0.8% cholesterol in the diet. At all levels of cholesterol safflower oil caused a fall of serum cholesterol between the second and third weeks but coconut oil and triolein gave a continued rise. Serum cholesterol concentration appeared to be in logarithmic relation to diet cholesterol. A second experiment showed only minor breed differences in the effect of fats on the response of serum cholesterol to a diet containing 0.8 cholesterol.

In 2 experiments with diets containing 0.8% cholesterol a wide range of iodine values and fatty acid composition of the diet fat was obtained by giving different fats and oils singly or in combination. Coefficients of correlation of I value and fatty acid components with serum cholesterol concentration were calculated. The results showed that fats high in saturated fatty acids promote hypercholesterolaemia and that this effect is counteracted by unsaturated fatty acids, by polyunsaturated more than by monounsaturated. Iodine value appeared to be more significant than polyunsaturated fatty acid content in determining serum cholesterol level. Some evidence was obtained that maize oil and cottonseed oil reduce serum cholesterol to an extent not attributable to their fatty acid composition.—F. C. Aitken. (Nutrition Abstracts & Reviews)

HILL, F. W., D. L. ANDERSON. (U. Massachusetts, Amherst.), **RUTH RENNER,** and **L. B. CAREW, Jr.**

STUDIES OF THE METABOLIZABLE ENERGY OF GRAIN AND GRAIN PRODUCTS FOR CHICKENS. *Poultry Sci.* 39(3): 573-579. 1960.—The metabolizable energy (M.E.) values of 21 grains and grain products were determined for the growing chick. All data were computed to an air-dry basis assuming 10% moisture for all materials, excepting corn, which was assumed to contain 15% moisture. On this basis, corn contained 1560; wheat, 1490; barley, 1280; oats, 1190; milo, 1480; and rye, 1300 Calories of M.E. per pound. M.E. values also are presented for standard by-products of these grains.—Auth. summ. (Biological Abstracts)

HILL, F. W., and RUTH RENNER. (Cornell U., Ithaca, N. Y.)
THE METABOLIZABLE ENERGY OF SOYBEAN OIL MEALS, SOYBEAN MILLFEEDS, AND SOYBEAN HULLS FOR THE GROWING CHICK. *Poultry Sci.* 39(3): 579-583. 1960.—Metabolizable energy (M.E.) of soybean oil meals, soybean millfeeds, and soybean hulls was estimated for growing chicks using glucose as the reference standard and correcting for N retention. Average values obtained, expressed on an air-dry basis computed to 10% moisture, were 1150 Calories per pound for 50% protein dehulled soybean oil meal, 1020 Calories per pound for 44% protein soybean oil meal, 570 and 350 Calories per pound for high protein and low protein soybean millfeeds, and 5 Calories per pound for soybean hulls. No relationship was evident between differences in proximate composition and M.E. content the case of the soybean meals. The M.E. content of soybean millfeed increased as the fat and protein content of this material increased and its crude fiber content decreased.—Auth. summ. (Biological Abstracts)

HOCK, A., and H. BERGNER. Jodeinbau (^{131}J) in die Schilddrusen von Kuken unter dem Einfluss von Tetracyclinen.
UPTAKE OF IODINE (^{131}I) BY THE THYROID OF CHICKENS UNDER THE INFLUENCE OF TETRACYCLINES. *Arch. Tierernahrung*, 1960, 10, 161-173. (Inst. Tierernahrungslehre, Humboldt-Univ., Berlin.)—Terramycin at 5 mg per kg bodyweight daily given to chickens from hatching favourably influenced growth; the benefit was greater in birds on chaff litter than on wire floors and was significant only on litter. In birds which showed significant improvement of growth there was also significant increase of thyroid activity, as shown by uptake of ^{131}I. Single large doses of 500 mg tetracycline per kg bodyweight had no significant effect on iodine uptake.—D. Duncan. (Nutrition Abstracts & Reviews)

HOFMANN, F., K. LOHLE, and D. MULSOW. Untersuchungen uber Korpergewichtsentwicklung, Futterverbrauch und Mastfahigkeit bei Junggansen.
WEIGHT GAINS, FEED INTAKE AND FATTENING CAPACITY OF YOUNG GEESE. *Jahrb. Arbeitsgemeinschaft Futterungsberatung*, 1958/1959, 2, 240-250.—The goslings, 60 in all, were fed every 3 h from 7 a.m. to 9 p.m. in the first 2 weeks of life and thereafter every 4 h until they were 9 weeks old. In the first weeks the feed had 14% digestible protein and thereafter 17%; the protein concentrate, given at 10% in the first week and then at 20%, contained fishmeal 33 and meat-and-bone meal 17%. The crude fibre content was about 4%. The fattening ration was mixed with chopped green clover or nettles in the ratio 2 : 1.

Average daily weight gain was 79.4 g. Over the whole period from hatching to fattening mean total gain was 5004 g at a cost of 14,921 g feed or 2.98 g feed per g gain. In the 9th week efficiency had fallen so that 7.01 g feed was needed per g gain, and from the point of feed utilisation the geese should have been slaughtered at 8 weeks. This is seldom possible if the feathers are of economic importance, since feathering is complete only at 9 or 10 weeks. It might be worth while to select for early feathering. Males were heavier than females.—D. Duncan. (Nutrition Abstracts & Reviews)

HOFMANN, F., K. LOHLE, D. MULSOW, and H. BLUM. Untersuchungen uber Korpergewichtsentwicklung Futterverbrauch und Mastfahigkeit bei Junggansen.
DEVELOPMENT OF BODYWEIGHT, FEED CONSUMPTION AND FATTENING CAPACITY OF YOUNG GEESE. *Arch. Geflugelzucht Kleintierk.*, 1960, 9, 225-241. (Inst. Tierzucht, Friedrich-Schiller-Univ., Jena.) Russian and English summaries.—During the first week of life 112 goslings were given a ration with 10.56% digestible protein and, after an intermediate period of 4 days, from 12 to 63 days a feed mixture with 17.07% digestible protein and containing 20% of a protein

concentrate of fishmeal, meat-and-bone meal, extracted soya meal and bean meal. The mixture was given with finely chopped red clover in the ration 2 : 1. During the last 3 weeks barley was given in addition and from the 4th week cod liver oil emulsion, 1 to 2 g daily. Average weekly weight gain was 510 g and g total nutrients per g gain was 2.38. Gains were greatest in the 5th week, 662.5 g at a cost of 1.86 g total nutrients per gain; efficiency was lowest in the final week, 4.31 g per g gain with a gain of only 374.7 g. Goslings less than 105 g at hatching were from 244 to 476 g lighter at 9 weeks than those initially above 105 g. Slaughter results for 14 geese are briefly reported.—R. G. Hankin. (Nutrition Abstracts & Reviews)

HOLMER, G., G. KRISTENSEN, E. SONDERGAARD, and **H. DAM.**
POLYENOIC FATTY ACIDS AND CHOLESTEROL IN BLOOD, HEART AND LIVER OF CHICKS FED ON HYDROGENATED AND UNHYDROGENATED ARACHIS OIL. *Brit. J. Nutrition*, 1960, 14, 247-253. (Danish Fat. Res. Inst., Copenhagen.)—Six groups, each of eleven 14-day-old chicks, were fed for 4 weeks on a synthetic diet with or without 10% hydrogenated or unhydrogenated groundnut oil and with or without 1% cholesterol. Some of the chicks in each group were then fasted for about 20 h before all were killed; polyenoic fatty acids were estimated in plasma, red cells, heart and liver and cholesterol in plasma, heart and liver of all the chicks.

There was a higher content of all polyenoic acids in plasma of fasted birds except in those given the unhydrogenated groundnut oil, which had increased amounts of tetraenoic acids and decreased amounts of dienoic acids; cholesterol reduced the amount of tetraenoic acids. In contrast to plasma and tissues, red cells of chicks given the fat-free diet did not show much increase of trienoic acids. The amount of dienoic acids in red cells was always greater than that of tetraenoic acids, which was not influenced by fasting or cholesterol.

In heart, tetraenoic and dienoic acids were deposited when the chicks were fed on unhydrogenated oil; the amount of tetraenoic acids was incrased by fasting but not when the diet before fasting contained cholesterol. In liver, the amounts of all polyenoic acids were higher after fasting.

In chicks given the fat-free diet without cholesterol or the diet containing unhydrogenated oil alone, fasting led to significantly higher cholesterol values. In the absence of cholesterol hydrogenated or unhydrogenated oil gave nearly the same plasma cholesterol values though greater amounts of cholesterol were deposited in heart and liver of chicks given hydrogenated oil. When cholesterol was given with unhydrogenated oil the increase of plasma cholesterol was greater than with cholesterol and hydrogenated oil, though values for heart and liver cholesterol were similar.—G. A. Garton. (Nutrition Abstracts & Reviews)

HURWITZ, S., and **P. GRIMINGER.**
OBSERVATIONS ON THE CALCIUM BALANCE OF LAYING HENS. *J. Agric. Sci.*, 1960, 54 373-377. (Dept. Poultry Sci., Rutgers Univ., New Brunswick, N.J.)—Two groups of 15 pullets 4 months old were put in laying cages and given to appetite diets with 1.85 and 2.70% Ca, each with 16.7% protein and 0.71% P, and with 750 I.U. vitamin D_3 per 100 g diet. Yield and weight of eggs were studied for all birds; 8 from each group were chosen for balance studies, and replacements in successive balance trials were made only when birds died. The balance trials were made for 5 consecutive days in each 4-week period, of which there were 12.

Birds on the high-Ca diet produced over the whole period of study significantly more eggs of significantly greater weight which was accounted for by the greater weight of shell. Feed consumption and bodyweight did not differ significantly, so the high-Ca birds used the feed more efficiently for production. Average Ca retention was significantly higher on the high-Ca diet in each collection period. Percentage retention of the Ca intake was similar in both groups as a whole, though

in full production laying birds on the lower intake appeared to retain a somewhat higher percentage. Both groups went into negative Ca balance at the start of laying, but later equilibrium or a small positive balance was achieved. Over the whole study it was calculated that the total Ca content of the body had increased by 9 and 77 g, respectively, for an average bird of each group. The total body Ca of an average Leghorn hen is only about 20 to 25 g; the possible sources of error are discussed. —D. Duncan. (Nutrition Abstracts & Reviews)

ISAACKS, R. E., B. L. REID, R. E. DAVIES, J. H. QUISENBERRY, and **J. R. COUCH.** (Texas A and M Coll., College Station.)
RESTRICTED FEEDING OF BROILER TYPE REPLACEMENT STOCK. *Poultry Sci* 39(2): 339-346. 1960.—Comparison of restricted feeding with full feeding of broiler type replacement pullets showed that restriction can be accomplished not only by limiting feed intake but also by the addition of varying levels of fiber to the diet. Restriction of feed intake from 8 or 9 weeks of age to 21 weeks of age resulted in an overall feed saving of 25% during the rearing period; whereas, restriction by means of incorporating 15 and 20% fiber to the diet resulted in a 39 and 49% increase in feed consumption respectively. Mortality was increased only when the fiber levels of the diet were high enough to substantially reduce the caloric intake of the bird. Restriction had no effect on egg production in one experiment but increased egg production in the 2d experiment. This is also true in regard to hatchability of fertile eggs.—J. R. Couch. (Biological Abstracts)

JENSEN, LEO S., and **JAMES McGINNIS.** (Washington State U., Pullman.)
INFLUENCE OF SELENIUM, ANTIOXIDANTS AND TYPE OF YEAST ON VITAMIN E DEFICIENCY IN THE ADULT CHICKEN. *Jour. Nutrition* 72(1): 23-28. 1960.—Studies on the effect of feeding semipurified diets containing Torula or dried brewers' yeast as a major source of protein on the expression of vitamin E deficiency in Single-Comb White Leghorn hens are reported. Hatchability of fertile eggs was markedly lowered by feeding of both diets. Mortality of offspring was markedly increased by using Torula yeast, but not with brewers' yeast. Two anti-oxidants had no effect on chick viability. Addition of 1 ppm of selenium failed to improve either hatchability or chick viability. —Authors. (Biological Abstracts)

JOHNSON, D., Jr., and **H. FISHER.** (Rutgers U., New Brunswick, N. J.)
THE AMINO-ACID REQUIREMENT OF LAYING HENS. 3. MINIMAL REQUIREMENT LEVELS OF ESSENTIAL AMINO-ACIDS: TECHNIQUES AND DEVELOPMENT OF DIET. *Brit. Jour. Nutrition.* 12(3): 276-285. 1958.—Using a basal diet containing only free amino-acids as N sources, the various amino-acid levels were reduced to determine minimal levels for egg production. Different responses to the reduction of various amino-acids were noted, indicating interactions. Lysine could be reduced to a minimal level in presence of excesses of all the other amino-acids, while histidine could only be reduced slightly until levels of the other amino-acids were reduced, after which further reduction was possible. Minimal levels for the essential amino-acids were determined using the ratio of amino-acids to lysine in whole egg protein as the basis for estimates.—J. E. Oldfield. (Biological Abstracts)

JOUSSELLIN, W., P. GANTES, and **J. LADRAT.** L'adjonction d'oxytetracycline aux aliments ne determine aucune modification de la teneur en cholesterol des differents tissus du poulet.
ADDITION OF OXYTETRACYCLINE TO FEEDS DOES NOT ALTER THE CHOLESTEROL CONTENT OF DIFFERENT TISSUES OF CHICKENS. *C.R. Acad. Agric.*, 1960, 46, 303-308. (Lab. Zootech., Ecole Nat. Agric., Grignon.)—Oxytetracycline, 10 or 200 mg per kg feed, was given to 2 groups of 52 male chickens from day-old for 9 weeks. The antibiotic had little effect on growth but reduced the feed required per unit weight gain. Serum cholesterol in chickens not given

the antibiotic was from 1.37 to 1.61, average 1.54, g per litre; corresponding values with 10 mg oxytetracycline were 1.13 to 1.35, 1.26, and with 200 mg 0.95 to 1.52, 1.33 Cholesterol in liver, fat and breast muscle was not affected and no atheromatous lesion was found in the aorta of any bird.—T. D. Bell. (Nutrition Abstracts & Reviews)

KAMAR, GAMAL A. R. (Cairo U., Giza, Egypt.)
FEEDING THYROPROTEIN TO COCKS DURING SUMMER. *Poultry Sci.* 39(5): 1148-1158. 1960.—Thirty cocks were divided into 5 groups. In each group 2 White Leghorn cocks, 2 White Baladi cocks and 2 White Baladi yearlings were used. One group served as the control, while in the other 4 groups the percentage of thyroprotein in the ration was 0.005, 0.011, 0.017 and 0.022. Semen was collected from each cock once every 2 weeks for 3 months. The groups with rations containing 0.011% and to some extent 0.017% thyroprotein had the highest semen characteristics. The White Baladi cocks showed the highest improvement in semen characteristics. White Baladi yearlings and White Leghorn cocks showed little response to treatment. During the 2d month of treatment the highest increase in all the semen characteristics occurred.—G. A. R. Kamar. (Biological Abstracts)

KARE, MORLEY R., and **HERBERT L. PICK, Jr.** (Cornell U., Ithaca.)
THE INFLUENCE OF THE SENSE OF TASTE ON FEED AND FLUID CONSUMPTION. *Poultry Sci.* 39(3): 697-706. 1960.—Using 1044 chicks it was demonstrated that taste can under certain circumstances control feed and fluid intake. With the addition of offensive tasting material water intake could be reduced 40% over an extended period; similarly food intake was limited even to the minimum for survival. The taste stimulus necessary to reduce intake was many times greater than that established to be offensive. Much smaller quantites of offensive flavor were necessary to reduce the intake of water than were necessary with feed.—Auth. summ. (Biological Abstracts)

KING, STEVEN C. (Purdue U., Lafayette, Ind.)
EXPERIMENTAL ERRORS IN CHICK NUTRITION TRIALS. *Poultry Sci.* 39(4): 791-794. 1960—Models utilized to isolate the variance due to pens in nutrition trials were developed and data, which fit these models, was assembled from several investigators working in different nutrition laboratories. Pooled results indicated that significant pen effects existed and accounted for 28.4 to 92.6% of the experimental error.—S. C. King. (Biological Abstracts)

KOWALEWSKI, K. (U. Alberta, Edmonton, Canada.)
LIPID PATTERN IN SERUM, LIVER, AND AORTA OF TURKEYS FED DIETS ADDED WITH BETA-AMINOPROPIONITRILE AND CHOLESTEROL. *Arch. Internatl. Pharmacody.* 126(1/2): 56-62. Illus. 1960.—Male broad breasted Bronze Sandstrom turkeys of 16 days were fed with standard turkey starter containing 0.025% beta-aminopropionitrile (BAPN) or 2% cholesterol and 5% olive oil or both for 4 weeks. There was a normal fed control group. BAPN feeding resulted in inhibition of growth, in severe deformities of extremities and 20% death from aortic reputure; these changes were not influenced by the addition of cholesterol and olive oil to the diet. Contrary to cholesterol, BAPN had no effect on the lipid content in plasma, liver and aorta.—F. A. Neleman. (Biological Abstracts)

KUNITZ, M.
CHICKEN INTESTINAL ALKALINE PHOSPHATSE. I. THE KINETICS AND THERMODYNAMICS OF REVERSIBLE INACTIVATION. II. REACTIVATION BY ZINC IONS. *Jour. Gen. Physiol.* 43(6): 1149-1169. 1960.—Purified chicken intestinal alkaline phosphatase is active at pH 8 to 9, but becomes rapidly inactivated with change of pH to 6 or less. Also, a solution of the inactivated enzyme at pH4.5 rapidly regains its activity at pH 8. At pH 6-8 a solution of purified alka-

line phosphatase consists of a mixture of active and inactive enzyme in equilibrium with each other. The rate of inactivation at lower pH and of reactivation at higher pH increases with increase in temperature. Also, the activity at equilibrium in the range of pH 6 to 8 increases with temperature so a solution equilibrated at higher temperature loses part of its activity on cooling, and vice versa, a rise in temperature shifts the equilibrium toward higher activity. The kinetics of inactivation of the enzyme at lower pH and the reactivation at higher pH is that of a unimolecular reaction. The thermodynamic values for the heat and entropy of the reversible inactivation and reactivation of the enzyme are considerably lower than those observed for the reversible denaturation of proteins. The inactivated enzyme at pH 4 to 6 is rapidly reactivated on addition of Zn ions even at pH 4 to 6. However, zinc ions are unable to replace magnesium ions as cocatalysts for the enzymatic hydrolysis of organic phosphates by alkaline phosphatase.—Author. (Biological Abstracts)

LADRAT, J., and **W. JOUSSELLIN.** Effet de la supplementation d'un regime avec des antibiotiques dans un elevage de poulets de chair non infecte.

EFFECT OF SUPPLEMENTING A RATION WITH ANTIBIOTICS IN REARING UNINFECTED TABLE POULTRY. *C.R. Acad. Agric.*, 1960, 46, 309-311 (with discussion 311-312).—In disinfected quarters 4 groups of chickens were fed on the floor from day-old for 9 weeks : to 3 groups 1, 2 or 4 mg oleandomycin was added per kg feed. In disinfected batteries there were 3 groups, to 2 of which 10 or 200 mg terramycin per kg feed was given. In neither trial was there any significant effect on growth or efficiency of feed conversion. There was a tendency to better efficiency when terramycin was given.—T. D. Bell. (Nutrition Abstracts & Reviews)

LEACH, ROLAND MELVILLE, Jr.

THE EFFECT OF MANGANESE, ZINC, CHOLINE AND FOLIC ACID DEFICIENCIES ON THE COMPOSITION OF EPIPHYSEAL CARTILAGE. *Dissertation Absts.* 21(1): 41. 1960.—Abstract. (Biological Abstracts)

LEASE, J. G., B. D. BARNETT, E. J. LEASE, and **D. E. TURK.** (South Carolina Expt. Sta., Clemson.)

THE BIOLOGICAL UNAVAILABILITY TO THE CHICK OF ZINC IN A SESAME MEAL RATION. *Jour. Nutrition* 72(1): 66-70. 1960.—Chicks fed purified rations containing sesame meal, made from decorticated K-10 seed as the sole source of protein, showed gross signs of zinc deficiency although the rations contained about 52 ppm of zinc. The chicks were raised in galvanized batteries and given tap water. Growth was significantly improved and leg deformities were greatly reduced when 60 or 120 ppm of zinc were added to the ration. Autoclaving the sesame meal led to significantly improved growth in some cases but did not prevent leg deformities in any case. Addition of a solution of ethylenediaminetetracetic acid, disodium salt (EDTA) to the sesame meal, or of dry EDTA to the ration greatly reduced leg deformities and resulted in as good growth as 120 ppm of zinc. Addition of zinc to the sesame meal rations resulted in a much greater increase in growth and decrease in leg deformities than the addition of zinc to isolated soybean protein rations.—Authors. (Biological Abstracts)

LEPKOVSKY, SAMUEL, and **FRED FURUTA.** (U. California, Berkeley.)

THE EFFECT OF WATER TREATMENT OF FEEDS UPON THE NUTRITIONAL VALUES OF FEEDS. *Poultry Sci.* 39(2): 394-398. 1960.—The nutritional value of a poultry feed. (U.C stock mash) may be improved by feeding it as a wet mash and this can be shown best when the dry and wet feeds are offered for only 2 hours daily. Less striking results are seen when these feeds are fed ad libitum. The nutritional improvement of the feed persists in the dry state when prepared

with minimal amounts of heat. The nutritional improvement of the feed is attended with greater feed intake and increased efficiency of utilization. Introducing water directly into the crops of birds on dry feed does not do the same thing and excess water so introduced will decrease food intake and growth.—S. Lepkovsky. (Biological Abstracts)

LEVEILLE, G. A., R. SHAPIRO, and **HANS FISHER.** (Rutgers State U., New Brunswick, N. J.)

AMINO ACID REQUIREMENTS FOR MAINTENANCE IN THE ADULT ROOSTER. IV. THE REQUIREMENTS FOR METHIONINE, CYSTINE, PHENYLALANINE, TYROSINE AND TRYPTOPHAN; THE ADEQUACY OF THE DETERMINED REQUIREMENTS. *Jour. Nutrition* 72(1): 8-15. 1960.—The maintenance requirements for trypotophan, phenylalanine, methionine, cystine and tyrosine were computed from nitrogen balance studies in adult roosters not depleted of protein. A diet supplying the determined maintenance requirements maintained the birds in positive nitrogen balance. Using a histidine-free diet which maintained positive nitrogen balance no changes in hematocrit levels were noted, but breast muscle concentration of anserine and carnosine decreased compared with control birds fed a histidine-containing ration. A significant correlation existed between maintenance requirements and amino acid content of feather protein.—Authors. (Biological Abstracts)

LEVIN, EZRA, N. T. RAND, J. D. MOSSER, and **V. K. COLLINS.** (VioBin Corp., Monticello, Ill.)

DEFATTED STARFISH MEAL AS SOURCE OF NUTRIENTS IN POULTRY RATIONS. *Poultry Sci.* 39(3): 646-654. 1960.—Defatted starfish meal made by the VioBin azeotropic process was nutritionally evaluated with growing chicks. Protein concentrates prepared from starfish either by pancreatic digestion or by washing with HCl had high protein quality values, comparable to high quality fish meals, when 20-30% starfish meal was incorporated into fish meal, the protein quality of the mixed products was increased. Defatted starfish meal was approximately equal to fish meal, on a protein basis when added at levels of 3 to 6% to purified or practical diets, while maintaining the same dietary Ca level. Defatted starfish can compete nutritionally and economically with fish meal as a source of protein, Ca and unidentified growth factors in poultry rations.—Auth. summ. (Biological Abstracts)

LEWIS, R. W., J. J. WOODS, and **J. R. COUCH.** (Prairie View A. and M. Coll., Texas.)

COMPATIBILITY OF NICARBAZIN WITH METHYL ESTERS AND ANIMAL FATS IN BROILER DIETS. *Poultry Sci.* 39(4): 910-916. 1960.—Levels of 1.5, 2, 3, and 4% prime tallow fed in broiler diets containing 0.0627% nicarbazin retarded the growth of floor-reared chicks under practical conditions. Comparable levels of methyl esters appeared to be more compatible with 0.0627% nicarbazin than identical levels of prime tallow. Results of battery experiments indicated that the 4% level of fat supplements was not as compatible with 0.0250% of nicarbazin as the 2% level of fat supplements, nor was the 4% level of prime tallow as compatible with 0.0250% nicarbazin as the same level of the methyl ester product.—J. R. Couch. (Biological Abstracts)

LIUZZO, J. A., J. G. LEE, A. B. WATTS, E. A. FIEGER, and **A. F. NOVAK.** (Louisiana State U., Baton Rouge.)

STIMULATION OF CHICK GROWTH WITH ALFALFA CONCENTRATES. *Poultry Sci.* 39(4): 823-827. 1960.—Three chick experiments were conducted to test the growth stimulating effects of concentrates prepared from dehydrated alfalfa leaf meal which were previously found to be active for *Neurospora sitophila.* These were prepared according to the method of Novak, Jonnard and Liuzzo (see Biol. Abst. 33(5): 19380. 1959), which involved acid-extraction of alfalfa leaf meal, precipitation of the extract with ethanol, extraction of the

ethanol filtrate with (1) ether (concentrate A) and (2) both ether and cholorform (concentrate B). Concentrate C was a combination of the ethanol precipitate, and the ether and chloroform extracts. The concentrates were supplemented to a practical ration at a level equivalent to 5% alfalfa leaf meal, and fed to chicks ad libitum for 8 weeks. Significant growth responses were obtained in the 1st experiment with concentrate A, in the 2d experiment with concentrate B; and in the 3d experiment with concentrates B and C. Results show that the concentrates which were active for *Neurospora sitophilia* are required also for maximum growth of chicks.—J. A. Liuzzo. (Biological Abstracts)

LOCKHART, W. C., REECE L. BRYANT, and **D. W. BOLIN.** (North Dakota Agric. Expt. Sta., Fargo.)

BLOOD MEAL AS A SOURCE OF PROTEIN IN TURKEY STARTING DIETS. *Poultry Sci.* 39(3): 720-728. 1960.—Five trials of 2 to 3 weeks duration were conducted with turkey poults comparing a commercial type bloodmeal, rotary vat dried, to soybean oil meal, meat meal, fish meal and freeze-dry blood meal. Growth response in all trials was depressed below that of the soybean protein control when the commercial dried blood was included in the diet. Feed per gain was depressed from 5 to 13% depending upon the level of commercial blood meal included in the diet. Freeze-dry blood supported better growth and feed utilization efficiency than did commercial blood. The metabolizable energy value for commercial blood was determined by direct calorimetry and found to be 1017 Cal. ± 13.6.—W. C. Lockhart. (Biological Abstracts)

MANTEL, K. Prufung der Moglichkeit des Ersatzes von Fischmehl durch getoastetes Sojaschrot und Trockenmagermilch.

POSSIBILITY OF REPLACING FISHMEAL BY HEATED SOYA MEAL AND DRIED SKIMMED MILK. *Arch. Geflugelk.*, 1960, 24, 263-270. (Geflugelzuchtlehranst. Oberbavern, Erding.)—During 351 days 240 Leghorn pullets had a grain mixture, 2% each of dried yeast and green lucerne meal, and 1 of 4 laying meals, each with about the same energy content and protein : energy ratio. The percentages of codmeal and heated soya bean meal for the 4 groups were 12 and 4, 6 and 10, 6 and 12, 3 and 16. The second mixture contaned also 2.5% dried skimmed milk.

Group 2 ate least and groups 3 and 4 most, but differences were slight. Average weight gains were, respectively, 121, 161, 82 and 76 g. Mortality was greatest in group 2 and least in group 3. The eggs weighed on average, 58.5 g. Yields of eggs; corrected to 55 g weight, were, respectively, 186, 186, 198.3 and 195.6. Feed utilisation was about the same for all groups. Cost of production per 100 g egg and meat was highest in group 1 and lowest in 3 and 4. Hatching results were best, 90.8%, in group 4. (The English summary does not refer to this paper.) —I. R. Anderson. (Nutrition Abstracts & Reviews)

MARCH, B. E., and **JACOB BIELY.** (U. British Columbia, Vancouver, Canada.)

EMULSIFIED OIL AS A LIQUID FEED SUPPLEMENT FOR POULTRY. *Poultry Sci.* 39(2): 279-281. 1960.—Three to four-week old chicks were given aqueous emulsions of corn oil in place of drinking water. An emulsion containing 10% of oil was well tolerated by the chicks and was consumed in amounts to comprise 23.8 and 16.4% of the total feed intake when the basal diets contained 27.5 and 21.5% protein respectively. The feeding of emulsions is suggested as a means of supplying high levels of oil without the difficulties associated with the mixing and storing of oily diets.—J. C. Biely. (Biological Abstracts)

MARTIN, W. G., and **H. PATRICK.** (West Virginia U., Morgantown.)

RADIONUCLIDE MINERAL STUDIES: RELATION OF BREED, AGE, AND VITAMIN B_{12} TO INORGANIC S^{35} METABOLISM IN CHICKS. *Poultry Sci.* 39(2): 282-286. 1960.—The addition of 100 μg

of vitamin B_{12} per kg of a simplified chick diet caused a marked retention of orally administered S^{35} sulfate in the sternum and tibia 24 hours after dosing. The vitamin addition to the soybean meal-corn practical diet effected a decreased S^{35} mineralization. The White Leghorn chicks exhibited a higher S^{35} retention than New Hampshire or White Leghorn× New Hampshire chicks regardless of diet. Young chicks retained a higher % dose S^{35} per g bone than older chicks and it has been found that optimum S^{35} retention occurs early in the chick's life and decrreses with age.—H. Patrick. (Biological Abstracts)

MARTIN, W. G., and **H. PATRICK.** 1961. (Poul. Sci. Dept., W. Va. U., Morgantown.)
THE EFFECT OF TAURINE ON THE SULPHATE-S^{35} RETENTION BY CHICKS. *Poultry Sci.* 40(1) 267-268.

MARTINA, C., and **C. ALEXANDRU.** Cercetari asupra aplicarii si eficacitatii sistemului de hranire la discretie a gainolir.
FEEDING HENS TO APPETITE. *Lucr stiint. Inst. Cercet. zooteh.*, 1959, 17, 463-472. Russian, French, German and English summaries.—For 8 months groups of 149 Rhode Island hens and 24 cocks were given their mash, a total of 130 g daily, 3 times a day, or the same made available throughout the day. All received 30 g whole grains in the evening, and 60 g green fodder. The birds fed to appetite ate 2.9% less mash and required 8.6% less per 100 g egg produced; eff production was 6.2% higher, loss of bodyweight during the laying period was less, fertile eggs were more, and hatchability higher. Time spent in distributing the feed was 7 times greater with feeding 3 times a day. (From English and French summaries.) — T. D. Bell. (Nutrition Abstracts & Reviews)

MASLIEVA, O. I. Effektivnost vitamina B_{12} pri skarmlivanii rastitel'nyh proteinov cypljatam i kuram.
VALUE OF VITAMIN B_{12} FOR CHICKENS AND HENS FED ON PLANT PROTEINS. *Fiziol biohim. pitan. sel'skohoz. zivot., Akad. Nauk Latv. SSR, Riga*, 1959, 77-82.—In the first study 7 groups each of 300 chickens were reared from hatching to 2 months of age in cages and thereafter in colony houses. All the diets were similar in energy value and had 13 5% digestible protein, but in some groups all the protein was of plant origin, from cereals and linseed and soya bean meals, and in others fishmeal also was included for comparison with the effects of biomycin (Aureomycin) or vitamin B_{12} or both; one plant protein ration contained 1 g choline chloride per kg dry meal. Up to 2 months the chickens of all groups had 5 to 10 g milk per head daily.

With a plant protein ration neither biomycin nor vitamin B_{12} alone improved growth up to 6 weeks of age, but together they were almost as good as the animal protein supplement and with animal protein gave the best growth. The chickens given choline did not differ from the controls given no supplement.

From 2 months of age only 3 groups of pullets were kept in the experiment; they were a control group with animal and plant proteins, one withh plant protein and both biomycin and vitamin B_{12}, and one given animal protein as well as the supplements. There were 100 pullets in each group. At 5 months their mean weights were, respectively, 1665, 1743 and 1866 g. When the first eggs were laid the yolks contained 64, 69 and 52 pg carotene and 5.6, 5.9 and 5.6 μg vtamin A, per g; and the livers of the day-old chicks from such eggs had 16.7, 22.8 and 20.2 μg vitamin A per g. Thus the supplements made the plant protein diet as good as that with animal protein.

Another trial was made in the following year with young hens from the same 3 groups, when they were 13 months of age. Mean weights were then 2257, 2335 and 2400 g and they had laid on average 107, 108 and 104 eggs each. When they were killed the breast muscles contained 15.41, 14.32 and 15.22% N in the dry matter and 4.34, 5.30 and 6.01% fat. Per kg, the livers contained 46.8, 50 and 69 mg vitamin A and 236,

324 and 330 μg vitamin B_{12}. The yolks of the eggs laid by the experimental groups also contained more vitamin B_{12}. The advantage of the supplements did not continue in chickens of the first generation.—D. Duncan. (Nutrition Abstracts & Reviews)

McCLYMONT, G. L., and M. W. McDONALD.
SCIENTIFIC POULTRY FEEDING. *New South Wales Dept. Agric.*, 1960 (5th ed.)., pp. 52. (Nutrition Abstracts & Reviews)

MEHRING, ARNON L., Jr., JOHN H. BRUMBAUGH, ANGUS J. SUTHERLAND, and HARRY W. TITUS. (Limestone Prod. Corp. America, Newton, N. J.)
THE TOLERANCE OF GROWING CHICKENS FOR DIETARY COPPER. *Poultry Sci.*, 39(3): 713-719. 1960.—Diets containing graded levels of Cu from 26 to 1176 ppm in the form of copper oxide were fed to growing chickens to the age of 10 weeks. The toxic level was about 500 ppm. The highest level of Cu caused approximately a 50% reduction in growth. After 10 weeks of age, the chicks were fed the basal diet without added Cu, and the recovery in growth was most rapid for those chicks whose growth was most retarded by the high levels of Cu. Greater quantities of Cu, Mo, and SO_4 were stored in the livers and spleens as greater quantities of Cu were fed. The levels of Cu, Mo, and SO_4 stored in the livers and spleens tended to return to normal after the feeding of Cu was discontinued. Feed efficiency was greater when Cu was added to the diet, up to the toxic level, and this suggests that the Cu may have exerted an effect similar to that of antibiotics.—A. L. Mehring, Jr. (Biological Abstracts)

MENGE, H., and ROBERT J. LILLIE. (U.S. Dept. Agric., Beltsville, Md.)
INEFFECTIVENESS OF ANTIBIOTIC COMBINATION ON RESPONSE OF CHICKS FED FISH SOLUBLES. *Poultry Sci.* 39(5): 1188-1190. 1960.—A combination of 3 antibiotics was fed to crossbred (New Hampshire X Barred Plymouth Rock) male chicks in an attempt to cause a change in the microflora population. The object of these studies was to produce a relatively sterile intestinal tract so that the requirement for the "fish factor" could be studied under optimal conditions uncomplicated by the influence of interfering organisms. A practical-type, corn-soya diet was fed alone and in combination with 4% fish solubles to serve as controls for the groups receiving the basal diet supplemented with a mixture of 3 antibiotics alone and in combination with 4% fish solubles. The antibiotic mixture supplied, in mg/kg of diet, the following: 100 mg streptomycin sulfate, 40 mg procaine penicillin G, and 70 mg nystatin. The results of these studies showed that the antibiotic combination failed to remove effectively the complicating influence of intestinal bacteria and allow for a positive assay for the unidentified growth factor in fish solubles.—H. Menge. (Biological Abstracts)

MENKE, K. H. Weitere Untersuchungen uber die Biosynthese von Vitamin B_{12} und Analogen in Huhn.
FURTHER STUDIES ON BIOSYNTHESIS OF VITAMIN B_{12} AND ANALOGUES IN THE HEN. *Arch. Geflugelk.*, 1960, 24, 137-141. (Inst. Tierzucht, Univ. Bonn.) English summary.—For earlier work see Abst. 3915, Vol. 29.
Three laying hens were given 4 μg $CaCl^2$ labelled with ^{60}Co, 10 μc. The droppings of 1 hen collected between 12 and 24 h later were dialysed against 0.2 M sodium citrate buffer and the labelled cobalamins were extracted with a 20% solution of *p*-chlorophenol in trichloroethylene and separated by column chromatography as described in the preceding Abst, with subsequent paper chromatography. Of the 12 peaks of radioactivity detected, 5 were identified as vitamin B_{12}, pseudovitamin B_{12}, Factor A, vitamin B_{12III} and a fraction which contained at least 2 substances, of which one was probably etiocobalamin.
The other 2 hens were killed after 6 and 12 h; liver, and stomach, duodenum, jejunum and caecum and their respective contents were taken

for study. Nearly all the radioactivity was in the contents of the caecum and the droppings. The percentage which was dialysable ranged from 65 in the jejunum (organ) to 98 in the contents of the caecum; it was always lower in the organs than in their contents, and the proportion of bound activity increased with time. Not all the activity was accounted for by cobalamins : in the liver under 10%, contrary to what was found in the earlier work.—W. M. Deans. (Nutrition Abstracts & Reviews)

MERRITT, E. S., J. H. DOWNS, R. BORDELEAU, and **B. F. TINNEY.** GROWTH, VARIABILITY OF GROWTH, AND MARKET QUALITY OF BROILERS ON MASH AND PELLETS. *Canad. J. Animal Sci.*, 1960, 40, 7-14. (Res. Branch, Canada Dept. Agric., Ottawa.)—The same adequate ration was offered as mash or pellets to chickens hatched and reared under uniform commercial conditions. The birds were weighed at 6, 9, 10 and 11 weeks of age.

On pelleted diets, compared with mash, weight gains in males were greater at all ages; the effect was less in females and ended at 10 weeks of age. There was wider variation within groups when pellets were given, and the variation was more in females and in younger than in male and older birds. Pellets increased the incidence of incomplete back feathering in both sexes, lowering the market grading of males but not of females. Pellets also increased the incidence of breast blisters in males; this did not affect grading.—J. G. Gordon. (Nutrition Abstracts & Reviews)

MORIMOTO, H., D. KUBOTA, and **S. ARIYOSHI.** STUDIES ON THE FEEDING STANDARD FOR LAYING HENS. I. DIGESTIBLE NUTRIENT CONTENTS OF THE CONVENTIONAL FEEDSTUFFS AND THEIR RELATIONSHIP TO THE DIGESTIBLE ENERGY CONTENTS. In Japanese with English summ.) *Bull. Natl. Inst. Agric Sci Ser. G* 19, 117-125. 1960.—Laying hens with surgically prepared artificial anus (fecal fistula) were used to estimate digestibility with 12 conventional feedstuffs, i.e. fish meal, soybean oil meal, corn, wheat, barley, naked barley, rice bran, rice bran oil meal, wheat bran, barley bran, fish soluble, alcohol by-product feed and butanol by-product feed. Digestibilities and digestible nutrient contents were tabulated. Digestible energy (difference between energy intake in feeds and energy excretion in feces) contents were estimated with the same feedstuffs at the same time. Correlation between total digestible nutrient contents and digestible energy contents was highly significant, and gave a regression equation as; $Y = 4.51X + 2$ (X: TDN, Y: digestible energy). In the case of the feedstuffs containing much protein such as fish meal and soybean oil meal, the correlation was less significant. The possibility of estimating TDN from digestible energy and vice versa with feed of certain protein content was discussed. —Authors. (Biological Abstracts)

MULLER, Z., and **V. OREL.** Vysledky pokusneho vykrmu kurat ruznych plemen.

FATTENING TRIALS WITH CHICKENS OF DIFFERENT BREEDS. *Zivocisna Vyroba*, 1960, 5, 441-448. (Vyzkumny ustav antibiotik Roztoky, Prague.) Russian and German summaries. (Nutrition Abstracts & Reviews)

MULLER, Z., J. ROEDL, Z. ZENISEK, and **V. LAUTNER.** Pusobeni penicilinu na uzitkovost krut se zretelem k obsahu nejdulezitejsich aminokyselin a vitaminu v nasadovych vojcich.

EFFECT OF PENICILLIN ON EGG YIELD OF TURKEY HENS WITH REFERENCE TO AMOUNTS OF THE MOST IMPORTANT AMINO ACIDS AND VITAMINS IN EGGS FOR SETTING. *Zivocisna Vyroba*, 1960, 5, 427-440. (Vyzkumny ustav antibiotik Roztoky, Prague.) Russian and English summaries.—Mean egg production during one season of 141 Bronze Breasted turkeys given N,N-dibenzylethylenediamine-dipenicillin, 9 mg per kg dry matter of feed, was 36.3 per bird compared with 26.1 for 120 turkeys not given the antibioitc;

average eggs weight was 78.1 and 80 g, respetcively. Total weight of eggs was increased by 35% for turkeys given antibiotic. The increase was only in weight of egg white. Chemical analysis of individual parts of eggs showed no significant difference between the groups; the yolk of eggs from turkeys given antibiotic had slightly more water. There was more β-carotene, vitamin A and, especially, tocopherol in eggs of the antibiotic group, which also had more essential amino acids in both white and yolk. Fertility of eggs was similar in the two groups; slightly more poults were hatched in the antibiotic group. (From English summary.)—R. G. Hankin. (Nutrition Abstracts & Reviews)

NABER, EDWARD C. (Ohio State U., Columbus.)
THE NUTRITIVE EVALUATION OF FEATHER MEALS AS A PROTEIN SOURCE FOR THE GROWING CHICK. IN: CONFERENCE ON EGGS AND POULTRY. *U.S. Dept. Agric. Agric. Res. Serv.* (Rept.) ARS- 74-12. 60-61. 1959. (Biological Abstracts)

NARAIN, R., C. M. LYMAN, C. W. DEYOE, and **J. R. COUCH.** 1961. (Depts. Poul. Sci. & Biochem. Nutr., Texas A & M Coll., College Station.)
PAPER ELECTROPHORESIS AND ALBUMIN/GLOBULIN RATIOS OF THE SERUM OF NORMAL CHICKENS AND CHICKENS FED FREE GOSSYPOL IN THE DIET. *Poultry Sci.* 40(1): 21-25.—The toxic effects produced by free gossypol lowered the total serum protein and produced a disproportionate decrease in serum albumen in the small weak and sickly White Leghorn chicks fed a diet supplemented with 0.10% free gossypol. In the second experiment New Hampshire chicks were fed a purified type of diet at 17, 21 and 42% protein levels, and 0.10% free gossypol (in the form of pigment glands) was added to the experimental diets. The birds were bled at 4 weeks. The results indicated that dietary free gossypol caused a lowering of the albumen/globulin ratio, but when the protein level of the diet was raised to 42%, this lowering did not take place.—From authors summary.

NEDELNIUC, V., F. POPESCU, S. FLORESCU, and **A. TACU.** Cercetari privind influenta cobaltului asupra cresterii corporale si a metabolismului energetic la puii de curca.
THE EFFECT OF COBALT ON GROWTH AND ENERGY METABOLISM IN YOUNG TURKEYS.) *Lucr. stiint. Inst. Cercet. zooteh.*, 1959, 17, 473-481. Russian, French, German and English summaries.—Cobalt chloride, 0.25, 0.50 or 1.50 mg per kg bodyweight, was given to turkey poults 4½ months old 3 times a week for 3, then daily for 2 weeks. Compared with controls resting metabolism was reduced by 9.5, 16.5 and 16.7% in order of increasing dose. The respiratory coefficients were 0.81, 0.86 and 0.87 and 0.71 in controls, suggesting a stimulation of protein metabolism. Bodyweight increased by 66.6, 75.8, 67.9 and 58.1%, respectively, during the experiment.—J. C. Rigg (Nutrition Abstracts & Reviews)

NELSON, T. S. (Internatl. Minerals and Chem. Corp., Skokie, Ill.), and **L. C. NORRIS.**
STUDIES ON THE VITAMIN K REQUIREMENT OF THE CHICK. I. REQUIREMENTS OF THE CHICK FOR VITAMIN K_1, MENADIONE AND MENADIONE SODIUM BISULFITE. *Jour. Nutrition* 72(2): 137-144. 1960.—Experiments were conducted to determine the quantitative requirements of the chicks for vitamin K_1, menadione and menadione sodium bisulfite. A vitamin K-deficient diet, composed primarily of isolated soybean protein, glucose, stripped lard, minerals, vitamins and an acetone extracted mixture of condensed fish solubles, distillers dried solubles and dried whey was fed. Male White Plymouth Rock chicks were used and the experimental period was 4 weeks. Prothrombin time determinations on whole blood were used as the criterion of vitamin K deficiency. These determinations were made on 10 chicks per treatment, at 2 and 4 weeks. The requirement for each form of vitamin K was determined by the calculated intercept of a

regression line with a base line. The regression line was calculated from the reciprocals of the prothrombin times of chicks fed diets deficient in vitamin K, while the base line was formed by the reciprocals of the prothrombin time of chicks fed adequate vitamin K. The requirement for vitamin K_1 at 2 and 4 weeks was 524 ± 46 and 528 ± 10 μg/kg of diet; 588 ± 284 and 479 ± 140 μg for menadione and 305 ± 51 and 357 ± 36 μg for menadione sodium bisulfite. When. expressed on a molar basis the requirement for vitamin K_1 at 2 and 4 weeks was 1.16 and 1.17 μmoles, respectively, per kg of diet, 3.42 and 2.79 μmoles for menadione and 0.98 and 1.08 μmoles for menadione sodium bisulfite. Thus on a molar basis vitamin K_1 and menadione sodium bisulfite were almost equally active and both were 2.5 times more active than menadione.—Authors. (Biological Abstracts)

NELSON, T. S. (Provex Corp., Jamestown, N. Y.), **R. J. YOUNG, R. B. BRADFIELD, J. B. ANDERSON, L. C. NORRIS, F. W. HILL,** and **M. L. SCOTT.**

STUDIES ON THE SULFUR AMINO ACID REQUIREMENT OF THE CHICK. *Poultry Sci.* 39(2): 308-314. 1960.—The sulfur amino acid requirement of chicks fed both practical type and purified diets was determined in 5 six week and 2 four week experiments. A highly significant improvement in feed conversion was obtained on addition of DL-methionine but no significant increase in growth was observed. The improved feed conversion was obtained at all protein levels in each of the energy levels studied.. The results of these experiments showed that the quantitative requirement for sulfur amino acids was 3.51±0.025% of the protein. This relationship was constant for all protein and energy levels studied. It was attributed to the narrow range in protein levels and to the fact that excess protein was not fed in any of the experiments. The results support the hypothesis that the essential amino acids must be present in the feed protein in the same proportions at all dietary protein levels regardless of energy level, except when excess protein is supplied. Under these conditions the quantity of the most limiting amino acid does not increase proportionately with increase in protein content. —Robert J. Young. (Biological Abstracts)

NESHEIM, MALDEN C., SAMUEL L. LEONARD, and **MILTON L. SCOTT.** (Cornell U., Ithaca, N. Y.)

ALTERATIONS IN SOME BIOCHEMICAL CONSTITUENTS OF SKELETAL MUSCLE OF VITAMIN E-DEFICIENT CHICKS. *Jour. Nutrition* 69(3): 359-370 1959.—Chicks were fed 2 different muscular dystrophy-producing diets, with and without vitamin E, and determinations of glycogen, phosphorylase, dry matter, ash, Na, K and creatine were made on the breast (white) and leg (red) muscles after 4 to 5 weeks of feeding. Body weights were approximately the same and the birds showed no outward manifestation of muscle dystrophy just before autopsy. Gross lesions in the dystrophic muscle were more apparent in the white than in the red muscle, althoughh microscopic detection of lesions in the latter was possible. The changes in creatine and K content of dystrophic muscles were variable and any decrease in these constituents in the dystrophic muscles could be explained mainly on the basis of increased water content. The Na content of dystrophic muscles was increased when expressed on either a wet or dry weight basis. The percentage of dry matter was less in the deficient chick breast muscle than in the normal. Active phosphorylase (a) and total phosphorylase (t) concentrations on both wet and dry weight basis were lower in the white muscle of the deficient chick but no consistent changes were detected in red muscle. Although both phosphorylase measurements were higher in white than in red muscle under all conditions, the ratios of a/t were always the same. Glycogen levels were lower in the white dystrophic muscles in comparison with the controls but no difference was observed between the normal and dystrophic red muscle. White muscle is basically richer in glycogen than red muscle. Both diets gave essentially the same results and 5 weeks is a preferred period for these changes to develop.—Auth. summ. (Biological Abstracts)

NORDIN, JOHN H., DAVID B. WILKEN, ROGER K. BRETTHAUER, R. G. HANSEN, and **H. M. SCOTT.** (U. Illinois, Urbana.)
A CONSIDERATION OF GALACTOSE TOXICITY IN MALE AND FEMALE CHICKS. *Poultry Sci.* 39(4): 802-812. 1960.—Female chicks are more sensitive to galactose than are males as indicated by a much greater mortality rate when fed galactose at a 15% level in a purified diet. The data demonstrate further that several metabolic differences between male and female chicks exist which may be related to galactose toxicity. Diethylstilbestrol implanted intradermally or mixed in the diet reduces the sensitivity, while testosterone implants enhance the sensitivity of female chicks to galactose. Growth or survival of male chicks fed galactose was not greatly altered when they were treated with either of these compounds. After consuming a standard dose of galactose, both the male and female chick show a blood response which is similar in the initial phases but differs finally in that the female chick requires a longer period of time to return to the fasting level. Absorption rate of galactose, therefore, is similar but the male has the ability to utilize galactose more readily. As isolated red cells of male chicks metabolized galactose more readily than do red cells from female chicks part of the difference is metabolic. Both the normal and galactose-toxic female chicks have a higher inorganic phosphorus level in the blood than do comparably treated male chicks. The quantity of uridine diphosphate acetylhexosamine nucleotides of chick liver is decreased in galactose toxicity; however, there is no effect on the uridine diphosphate acetylglucosamine to uridine diphosphate acetylgalactosamine ratio of 70:30 as a result of the toxicity. Uridine diphosphate galacturonic acid does not occur in liver extracts containing an abundant supply of uridine diphosphate galactose.—H. M. Scott. (Biological Abstracts)

OBRADOVIC, M., and **G. I. HANSEN.** Prilog poznavanju mogucnosti sinteze tio-amino-kiselina iz neorganskog sumpora kod kokosi peroralnom upotrebom S^{35}. Prethodno saopstenie.
POSSIBILITY OF SYNTHESIS OF SULPHUR AMINO ACIDS FROM INORGANIC SULPHUR BY THE HEN INVESTIGATED WITH ^{35}S GIVEN BY MOUTH. PRELIMINARY COMMUNICATION. *Veterinaria, Sarajevo,* 1960, 9, 323-330. (Inst. Stocarstvo, Zemun Polje, Belgrade.) English summary.—Three hens received daily in the preliminary and experimental periods 40 g barley and 60 g of a complex protein, vitamin and mineral mixture. During the experiment they had a daily addition of 0.06 mg ^{35}S as sulphate. The ^{35}S was recovered in excreta, carcase, feathers and eggs in both organic and inorganic form; in excreta and especially in eggs the organic considerably exceeded the inorganic fraction. A little activity was in crystine and less in methionine, but the form of the greater part of the organic ^{35}S has yet to be studied.—D. Duncan. (Nutrition Abstracts & Reviews)

OLSON, G., W. C. LOCKHART, D. W. BOLIN, and **R. L. BRYANT.** 1961. (Dept. Poul. Husb., N. D. Agr. Coll., Fargo, N. D.)
METABOLIZABLE ENERGY VALUES OF SOYBEAN OIL MEAL AND MEAT MEAL AS AFFECTED BY PROTEIN LEVEL AND TYPE. *Poultry Sci.* 40(1): 260-262.

OLSSON, N. Forsok med terramycin till slaktkycklingar.
TERRAMYCIN FOR TABLE POULTRY. *Kungl. Lantbrukshogsk. Statens Husdjursforsok Sartryck Forhandsmedd.,* No. 139, 1960, pp. 19. English summary.—For 11 weeks 4 groups of 60 day-old Plymouth Rock chicks were given a broiler ration with 23% crude protein from animal and vegetable sources; the ration was given with no terramycin or with 10 g per ton for 11, 8 or 6 weeks. Weight gains were higher in the groups given terramycin, best, about 7%, in the group given the antibiotic for only 6 weeks. The antibiotic had no effect on growth rate after the first 4 weeks of life. There was no significant difference in efficiency of feed conversion or in carcase yield.—R. G. Hankin. (Nutrition Abstracts & Reviews)

OSTRANDER, JOYCE G., RUTH JORDAN, W. J. STADELMAN, J. C. ROGLER, and GLADYS E. VAIL. (Purdue U., Lafayette, Ind.)
THE ETHER EXTRACT OF YOLKS OF EGGS FROM HENS ON FEED CONTAINING DIFFERENT FATS. *Poultry Sci.* 39(3): 746-750. 1960.—The amount and the iodine absorption value of the ether extract of yolks of eggs laid by hens on 3 different diets were determined. One group of hens was fed on a stock ration for laying hens; a 2d and a 3d group received the same ration supplemented with 10% corn oil and 10% beef tallow, respectively. Individual eggs from hens on the 3 diets were analyzed. Results indicated that neither corn oil nor beef tallow added to the hens' regular diet significantly affected the total ether extract of the egg yolks; however, iodine absorption values of the extracts were significantly affected. Corn oil in the diet increased and beef tallow decreased the iodine value. Therefore, there is evidence that it would be possible to modify a stock ration for laying hens to produce egg yolk lipids of different degrees of saturation.—Auth. summ. (Biological Abstracts)

OUSTERHOUT, L. E.
SURVIVAL TIME AND BIOCHEMICAL CHANGES IN CHICKS FED DIETS LACKING DIFFERENT ESSENTIAL AMINO ACIDS. *J. Nutrition*, 1960, 70, 226-234. (Dept. Poultry Husb., Univ. California, Davis.)—The effect of purified diets lacking one, several or all essential amino acids or all amino acids was studied. Observations included weight change, median survival time, ability of chicks alive after median survival time to recover, amino acid and peptide concentration in muscle tissue and changes in blood composition. Chicks deprived of an essential amino acid lost weight rapidly for a few days then remained at relatively constant weight for variable periods and finally lost weight rapidly before death. The initial weight loss was generally least with diets which allowed the longest survival time and the duration of the period of stable weight depended on which amino acid was lacking. Chickens fell into 3 groups according to median survival time which was less than 20 days when *iso*leucine or valine was lacking, 50 to 60 days when lysine or histidine was lacking and 23 to 36 days with all other diets. A possible reason for the short survival of chicks deprived of valine or *iso*leucine appeared from the results of estimation of free amino acids in muscle. No difference in level of alanine, arginine, phenylalanine or tyrosine ascribable to lack of these acids in the diet was found but in chickens deprived of valine or *iso*leucine the free valine or *iso*leucine in muscle was reduced and leucine content was increased. It is suggested that such imbalance of tissue amino acids may contribute to early death. A possible explanation of the prolonged survival of chickens deprived of histidine was found in the drop in muscle carnosine content; those deprived of it may be able to utilise histidine from that source. The fall in packed cell volume in chickens deprived of histidine or lysine suggested Hb as another possible source of these amino acids in deprived birds.

The only lesion observed was a variable incidence of folded tongue. —F. C. Aitken. (Nutrition Abstracts & Reviews)

OZOL, E. E., and S. K. KUPLE. Vljanie razlicnyh antibioticeskih vescestv na rost cypljat.
EFFECT OF DIFFERENT ANTIBIOTICS ON GROWTH OF CHICKENS. *Fiziol. biohim. pitan. sel'skohoz. zivot., Akad. Nauk Latv. SSR, Riga*, 1959, 13-17.—There were 4 groups of 50 and 5 of 120 chickens; the basal diets of all groups were similar but they changed with age over the periods of experiment 1 to 5, 6 to 10 and 11 to 30 days from hatching. The main sources of protein were soya meal and, from the 6th day, fishmeal. Besides 2 control groups, experimental groups received, in mg per 100 g ration, furazolidone 2, 4 or 8, or penicillin 1 or 2, or biomycin (Aureomycin) 0.5 or 1.

The best absolute weight gain and the greatest improvement over the control groups were produced by 1 mg penicillin, which was followed closely by 4 or 8 mg furazolidone and 2 mg penicillin. Furazolidone gave

the highest Hb values but did not increase liver vitamin C as much as did penicillin. Biomycin had very little influence on growth.—D. Duncan. (Nutrition Abstracts & Reviews)

PATRIK. I. A., and Ja. JAKOVENKO. Novyj korm dlja pticy.

A NEW POULTRY FEED. *Pticevodstvo*, 1960, No. 8, 19-21.—Tests were made of a product termed SAV, said to have developed in France (no reference is given) by growing yeast on whey; it contains yeast protein, about half the lactose of the whey, vitamins and "the valuable biological concentrate formed in the process of synthesis of yeast." It is proposed that the concentrate should be prepared in the Soviet Union.—D. Duncan. (Nutrition Abstracts & Reviews)

PATRIK, I. A., and A. A. PREVO. Otkorm utjat i ego effektivnost.

FATTENING DUCKLINGS AND ITS EFFECTIVENESS. *Pticevodstvo*, 1960, No. 7, 23-27.—For intensive fattening of ducks a concentrate mixture with 11.5% protein was as good as one with 13%. Ducks weighing 1 to 1.4 kg at 50 to 55 days could be intensively fattened in 9 to 12 days, but it was not economically worth while trying to fatten ducks weighing more than 2 kg at 55 days. For the fattening period ducks were fed 3 times a day on wet mash; a recomemnded ration was, per cent, maize 26, whole oatmeal 17.5, barley 22, wheat offals 16, meat-and-bone meal 1.5, sunflower and soya bean cakes 11.5, chalk 2.5, bonemeal 1.7 and salt 1.3, with 15% fresh minced greens and up to 1.5% baker's yeast.—D. Duncan. (Nutrition Abstracts & Reviews)

PETERSEN, C. F., E. A. SAUTER, D. H. CONRAD, and C. E. LAMPMAN. (U. Idaho, Moscow.)

EFFECT OF ENERGY LEVEL AND LAYING HOUSE TEMPERATURE ON THE PERFORMANCE OF WHITE LEGHORN PULLETS. *Poultry Sci.* 39(4): 1010-1018, 1960.—Two experiments, each of 40 weeks' duration were conducted to determine the influence of 2 energy levels, 2 forms of feed and 2 temperature conditions upon egg production of White Leghorn hens. Corn was the major cereal portion of the high energy diet which contained 910 calories of PE (productive energy) per pound whereas barley was used in the low energy (650 calories) diet. Each ration was fed as crumbles and as mash to duplicate lots of 75 hens each. During the 2d experiment, environmental temperature of one replicate of each diet was maintained at 55-58 degrees F in contrast to variable temperatures experienced with typical poultry housing. Egg production was lower with the mash form of the low energy diet but permitted egg production equal to either form of the high energy diet when crumbled. Energy requirements (PE) for maximum production was approximately 200 calories per day. High energy diet significantly decreased feed consumption and improved feed efficiency Maintaining uniform house temperature significantly increased egg production and feed efficiency whereas body weight gains were slightly reduced. Both high energy and uniform house temperature resulted in reduced moisture content of litter. The egg weight and albumen quality were not influenced by any of the treatment variables.—C. F. Peterson. (Biological Abstracts)

PICCHI, GIUSEPPE. Risultati della crescenza ed ossservazioni istologiche in polli alimentati con antibiotici.

SOME OBSERVATIONS ON THE GROWTH AND HISTOLOGIC STRUCTURE IN CHICKENS FED WITH ANTIBIOTICS. *Zootec. e* Vet. 13(3): 98-106. 1958.—Eighteen chickens were divided into a control group, a group fed with Vigofac of the Pfizer Co., (used as integrating alimentary element), containing unidentified growth factors, and a third group fed with T.M. 5 of the Pfizer Co. (used as integrating alimentary element), containing Terramicin (oxytetracycline). Alimentary integration by means of Vigofac and T.M. 5 was particularly useful for growth, without causing any difference in the edocrine glands examined.—Author. (Biological Abstracts)

POTTER, L. M., L. D. MATTERSON, A. W. ARNOLD, W. J. PUDELKIEWICZ, and E. P. SINGSEN. (U. Connecticut, Storrs.)
STUDIES IN EVALUATING ENERGY CONTENT OF FEEDS FOR THE CHICKS. I. THE EVALUATION OF THE METABOLIZABLE ENERGY AND PRODUCTIVE ENERGY OF ALPHA CELLULOSE. *Poultry Sci* 39(5): 1166-1178. 1960.—A study with growing chicks was conducted to determine the metabolizable and productive energy values of alpha cellulose when fed in 3 diets and at 3 levels of intake. In the 54 pen experiment, the average metabolizable energy of cellulose and its standard error were estimated to be -0.112± 0.051 Calories per g of dry matter which is significantly less than 0 when an extremely low value was omitted from the average. Average productive energy of cellulose and its standard error were -0.093 ± 0.083 Calories per g dry matter, a value which fails to be significantly different from 0. There were significant differences in estimates of maintenance requirement per g average live weight among chicks fed the different basal rations. In productive energy determinations, the validity of underlying assumptions that the maintenance requirement of the chick is a function of the average live weight during the experiment and that maintenance requirement is independent of the diet consumed is questioned.—L. M. Potter. (Biological Abstracts)

POTTER, L. M., L. D. MATTERSON, and E. P. SINGSEN. (U. Connecticut, Storrs.)
THE VALUE OF CORN VERSUS FAT AND WHEAT BRAN IN A PRACTICAL BROILER RATION COMPARED TO THEIR PREDICTED ENERGY VALUES. *Poultry Sci.* 39(5): 1178-1182. 1960. —A 24-pen chick experiment was conducted involving 3 dietary levels of fat, 0, 3.5, and 7.0%, and 2 levels of wheat bran, 10 and 0%. For each 1% fat added at the expense of corn, 8-week body weights were increased by 7.71 g and gain: feed ratio by .00515 and for each 1% corn added at the expense of wheat bran, body weight was increased by 5.58 g and gain:feed ration by .00237. Feed efficiency was better predicted by metabolizable energy values than by productive energy values. For each 20 to 22 metabolizable Calories added per lb. of feed, gain: feed ratio was increased 1%.—L. M. Potter. (Biological Abstracts)

POTTER, L. M., and L. D. MATTERSON. (U. Connecticut, Storrs.)
METABOLIZABLE ENERGY OF FEED INGREDIENTS FOR THE GROWING CHICK. *Poultry Sci.* 39(3): 781-782. 1960.—Sixty-one samples of feed ingredients, representing 27 poultry feedstuffs, were evaluated for their metabolizable energy. The determined meabolizable energy values, corrected to nitrogen equilibrium, of the ingredients tested are presented.—Authors. (Biological Abstracts)

PREMACHANDRA, B. N., and C. W. TURNER.
RESERPINE AND THYROID ACTIVITY IN FOWLS. *Proc. Soc. Exp. Biol. Med.*, 1960, 104, 306-309. (Dept. Dairy Husb., Univ. Missouri, Columbia.)—Experimental birds were New Hampshire fowls in groups of 10 without temperature control and pigeons in groups of 15 to 18 at a constant temperature of 78°F. Recorded were feed consumption and bodyweight; release rate of ^{131}I in fowls given Tapazole to prevent recycling, without reserpine and with 10, 20, 30, 50 or 100 μg reserpine per 100 g bodyweight daily for 5 days; and thyroxine secretion rate in pigeons without reserpine or with 5, 10, 15 or 30 μg per 100 g for 2 days and then with reserpine and increasing amounts of L-thyroxine. In both studies thyroid activity was affected by reserpine only when bodyweight had fallen significantly, the fall of weight corresponding to reduction of feed intake. Apparent limiting values for reserpine effect were 20 μg per 100 g daily for fowls and 15 μg for pigeons. Amounts commonly used for the tranquillising effect are held to be innocuous to the thyroid.—J. G. Gordon. (Nutrition Abstracts & Reviews)

PRICE, K. E. (Chas. Pfizer and Co., Inc., Terre Haute, Ind.), **Z. ZOLLI, Jr., and G. A. DONOVAN.**

THE INFLUENCE OF ORALLY AND PARENTERALLY ADMINISTERED SALTS OF TEREPHTHALIC ACID ON OXYTETRACYCLINE SERUM LEVELS IN CHICKENS. *Poultry Sci.* 39(3): 617-626. 1960.—Potentiation of serum oxytetracycline (OTC) serum levels in chickens by terephthalic acid (TA), its sodium salt and several of its ethanol amine salts was investigated. Both the antibiotic and the potentiating agents were administered in water, in feed or subcutaneously. TA and its soluble salts given by all 3 routes increased serum OTC levels over those of controls which received antibiotic only. When OTC was administered orally, degree of potentiation appeared to be greater with 500 g/ton in feed or 275 mg/l of water than it was with 200 g/ton or 110 g/l. This occurred whether TA salts were administered in feed or water. The data did not permit determination of optimum levels of orally administered terephthalates for maximum potentiating activity. It was indicated, however, that, with the levels of OTC studied, maximum increases in serum levels over controls would be obtained with 0.05 to 0.15% equivalent of free acid of soluble TA derivatives in water and from 2 to 4 times this in feed. The data were not sufficient for estimating the optimum potentiating level of disodium terephthalate when administered subcutaneously. All doses definitely potentiated OTC serum levels, but those providing near maxima ranged from 23 mg to 150 mg/l.5 lb. bird under different conditions.—D. F. Chichester. (Biological Abstracts)

PRICE, K. E., and Z. ZOLLI, Jr. 1961. (Chas. Pfizer & Co., Agr. Res. & Devel. Dept., Terre Haute, Indiana.)

PRELIMINARY STUDIES IN CHICKENS ON THE RELATIVE ABSORPTION CAPACITIES FOR OXYTETRACYCLINE OF VARIOUS TRACT SEGMENTS. *Poultry Sci.* 40(1): 153-155.—The average concentrations of antibiotic found in blood serum, liver and urine after 8 mg. of antibiotic were placed in the duodenum, jejunum, ileum and cecum were measured at 2 and 4 hrs. after injection. Absorption was greatest in the jejunum, followed by duodenum, ileum and cecum in descending order. The ligation procedure used in their experiments was suggested to be superior to *in vitro* techniques.—R. G. Jaap.

RAHMAN, M. M., C. W. DEYOE, R. E. DAVIES, and J. R. COUCH. (Texas A. and M Coll. System, College Station.)

SELENIUM AND EXUDATIVE DIATHESIS IN CHICKS AND POULTS. *Jour. Nutrition* 72(1): 71-76. 1960.—Symptoms of exudative diathesis were produced in chicks fed a vitamin E-free Torula yeast diet. The condition was prevented by the addition of vitamn E or of dried brewer's yeast to the basal diet. Corn distiller's dried solubles and condensed fish solubles were also active in this respect. S fed at 0.1 ppm or 0.05 ppm as sodium selenate in the diet successfully replaced vitamin E or dried brewer's yeast in the prevention of the gross symptoms of exudative diathesis in chicks and in preventing the increase in cell volume, the reduction in blood hemoglobin content, in red cell count, total serum proteins and in the A/G (albumin /globulin) ratio. The incidence of exudative diathesis in turkey poults was prevented by the addition of 0.05 ppm of S (selenate). Unlike vitamin E, the dried brewer's yeast and S did not prevent the rancidity of feed fat. In the absence of vitamin E, S (selenate) promoted growth when fed at 0.1 or 0.05 ppm in the diet, the latter level being slightly more effective In the presence of vitamin E, no growth response was observed by the supplementation of S or dried brewer's yeast in the diet. The growth response due to dried brewer's yeast was comparable with that resulting from 0.1 ppm Se. Se, vitamin E, or dried brewer's yeast did not affect the Na, K or Ca level of the serum of the chicks. The alkaline (calcium oxide) ash of dried brewer's yeast had partial effectiveness against the condition of exudative diathesis, equivalent to that due to about 0.025 ppm Se (selenate) in the diet. No protection was observed when dried brewer's yeast, ashed in the presence of 10% concentrated HCl, was added as a supplement to the diet, Se vitamin E, or the use of

starch as a carbohydrate source completely prevented the development of exudative diathehis in turkey poults fed a Torula yeast diet.—Authors. (Biological Abstracts)

RAHMAN, M. M., R. E. DAVIES, C. W. DEYOE, B. I. REID, and **J. R. COUCH.** 1961. (Depts. Poul. Sci. and Biochem. and Nutr., Texas A & M Coll. System, Collegt Station, Texas.)

ROLE OF ZINC IN THE NUTRITION OF GROWING PULLETS. *Poultry Sci.* 40(1): 195-200.—Zinc deficiency was produced in chicks fed a purified soybean protein basal diet assaying 14 ppm. zinc, producing the following symptoms: Brittle, frizzled feathers with unlaced barbules; persistence of juvenile feathers, scaly skin, swollen hocks, shortening and thickening of long bones; leg weakness, stiff gait and inability to walk; high respiration rates; reduced growth from consumption of less feed and water; reduced protein and potassium in the serum; increased hemoglobin concentration, packed cell volume and red blood cells probably due to hemo-concentration; 6 weeks delay in sexual maturity; and higher defatted bone per 100 gms of body weight. Addition of 20 ppm. zinc either as zinc oxide dissolved in acetic acid or as zinc-bacitracin to the 14 ppm. in the basal diet prevented all deficiency symptoms. Forty ppm. addition to the basal was no more effective and was not toxic.—From authors summary.

REBDEV, JU. L. Ispol'zovanie kormovogo ljupina v korm ptice.

USE OF FODDER LUPINS IN POULTRY FEEDING. *Ptice-vodstvo,* 1960, No. 9, 22-24.—Fodder lupin seed was given as 10 or 20% in the rations of pullet chickens and was compared with 10% linseed meal. Besides the seeds the birds received in summer green lupin and in winter lupin silage. They were studied up to a year old. All the rations contained some animal protein from cooked meat and dairy wastes. The lupin protein was as good as the linseed protein. In a practical trial replacement of 20 g oats in rations for laying hens by 20 g lupin increased egg yield by 13 to 15%.—D. Duncan. (Nutrition Abstracts & Reviews)

RENNER, RUTH. (Cornell U., Ithaca, N. Y.), and **F. W. HILL.**

THE UTILIZATION OF CORN OIL, LARD AND TALLOW BY CHICKKNS OF VARIOUS AGES. *Poultry Sci* 39(4): 849-854. 1960.—Utilization of corn oil, lard and tallow by growing chicks of various ages and by adult hens was studied by determining the metabolizable energy values and absorbabilities of the ingested fats. Of these fats only the utilization of tallow changed with age. The values for utilization of this fat at 2 and 8 weeks of age were 70% and 80%, respectively. The 8-week-old chick utilized tallow as well as the adult hen. In contrast, the average utilization values for lard and corn oil for all age groups were 92% and 94%, respectively. Comparable assessments of lard and tallow were obtained by determination of either metabolizable energy values or absorbabilities of the fats in young chicks. Values for the utilization of corn oil by chicks and for corn oil, lard and tallow by hens were slightly higher when determined by absorbability, than were obtained by determining metabolizable energy values. From the relatively insignificant size and nature of this difference, it appears that a high dietary level of fat does not have any major effect on the digestion and absorption of other nutrients.—R. Renner. (Biological Abstracts)

RICHARDSON, C. E., A. B. WATTS, W. S. WILKINSON, and **J. M. DIXON.** (Louisiana State U., Baton Rouge.)

TECHNIQUES USED IN METABOLISM STUDIES WITH SURGICALLY MODIFIED HENS. *Poultry Sci.* 39(2): 432-440. Illus. 1960.—Techniques were developed for using hens with exterorized recta and exteriorized ureters in metabolism studies. These techniques involved methods of collection, preparation and pelleting of purified diets, cannulation to maintain passage of feces and the use of 4% boric acid solution to preserve the N components of the urine. Surgically modified

hens were kept in excellent health for periods up to 10 months and continued to lay normally. The experimental evidence showed that boric acid was an excellent preservation for chicken urine. Methylcellulose was an excellent binder for pelleting of purified diets.—A. B. Watts. (Biological Abstracts)

RICHERT, D A., B. Q. PIXLEY, and **M. P. SCHULMAN.**
ERYTHOPOIESIS IN DUCKS WITH VARIOUS B-VITAMIN DEFICIENCIES. *J. Nutrition*, 1960, 71, 289-295. (Dept. Biochem., State Univ. New York, Upstate Med. Center, Syracuse.) For previous work see Abst. 436, Vol. 28; p 328, Vol. 30.—Day-old White Pekin ducklings were fed for 4 or 5 days on a commercial starter and then in groups of 12 on a purified diet, complete or without thiamine, riboflavin, nicotinic acid, pantothenic acid or vitamin B_6. After from 9 to 12 days 6 in each group were given phenylhydrazine, 1.4 mg per 100 g bodyweight on 2 successive days by subcutaneous injection. All the ducklings were killed 4 days after the first injection and blood from the jugular vein was studied.

Phenylhydrazine produced a marked increase of reticulocytes in all. whether deprived of vitamins or not. In deprived birds, Hb value and red cell count after phenylhydrazine were lower than in those given a complete diet; the differences were significant except for Hb in thiamine deficiency, red cell count in riboflavin deficiency and both in nicotinic acid deficiency. The effect of phenylhydrazine in increasing mean corpuscular volume and decreasing mean corpuscular Hb concentration was not modified by deficiency, except of vitamin B_6, in which corpuscular volume was reduced.

The rate of haem synthesis after treatment with phenylhydrazine was studied *in vitro* by incubating blood with glycine-2-^{14}C for 2 h. Synthesis of δ-aminolaevulinic acid by washed red cell haemolysates was studied also. Haem synthesis was decreased only by vitamin B_6 deficiency, and was restored by adding pyridoxal phosphate. Synthesis of δ-aminolaevulinic acid was reduced by all deficienies, by vitamin B_6 deficiency sufficiently to explain the decrease of haem synthesis.—A. M. Copping. (Nutrition Abstracts & Reviews)

RIMLER, K., A. SUSCHKA, and **M. TOTH.** 1960. (Res. Inst. Breed. Farm Anim., Godollo.) A csibe gyors hizlalasa.
FATTENING CHICKS QUICKLY. *Kiserl. Kozl Allattenyeszt.*, 1959 (3): 3-13. (Russian and German summaries.)—Fattening trials were carried out with 7 groups of purebred and crossbred chicks including the New Hampshire, Plymouth Rock, Hungarian White, Hungarian Yellow and Hungarian Barred breeds. Weight gains from 1 to 52 days of age were greatest and food utilisation was most efficient in the Plymouth Rock×Hungarian Yellow crossbreds. Purebred New Hampshires and Hungarian Yellows were also satisfactory.—Abstract of summaries. (Animal Breeding Abstracts)

RITCHEY, S. J., and **L. R. RICHARDSON.** (Texas Agric. Expt. Sta., College Station.)
THE EFFECT OF IRRADIATED VEGETABLE OILS AND ANIMAL FATTY TISSUE AND STORAGE OF THE DIET ON GROWTH AND MORTALITY IN CHICKS. *Poultry Sci.* 39(2): 404-408. 1960.—Control and irradiated soybean oil, corn oil, beef and pork fatty tissue were each mixed in a synthetic diet at a level of 10%. The diets were then fed to baby chicks after they had been stored for zero, one, two and three weeks. Diets containing irradiated soybean and corn oils were equal to those containing the nonirradiated oils, and their nutritional value of diets was not decreased after they had been stored for as long as 3 weeks. Diets containing irradiated beef or pork fatty tissue supported a slow rate of growth and the mortality rate was high. Addition of an antioxidant (BHT) at the time the diet was mixed or before irradiation of the fatty tissue resulted in normal growth and low mortality. Supplementing the diets with vitamins A, D, and E

showed that most of vitamin A and some vitamin D were destroyed by the presence of the irradiated fatty tissues in the diet. — S. J. Ritchey. (Biological Abstracts)

ROBENALT, RICHARD C. (U. California, Davis.)
THE THIAMINE REQUIREMENT OF YOUNG TURKEY POULTS. *Poultry Sci.* 39(2): 354-360. Illus. 1960.—A purified diet containing levels of 0, 50, 100, 200 and 300 μg of thiamine per 100 g of ration was fed to determine the minimum requirement to prevent deficiency symptoms. The 100 μg level was adequate up to 12 days of age. No attempt was made to establish a requirement beyond this age because of an apparent slow destruction of thiamine by certain minerals which could not be eliminated from the ration. Some modification of the initial diet was necessary to obtain optimum growth. Changes were made in the salt mix and ration to eliminate minerals shown to destroy thiamine, and a purified soybean protein was substituted for casein-gelatin All known required vitamins were added individually to the basal ration rather than as a vitamin mix. Thiamine was dissolved in ethyl alcohol and added to the diet volumetrically because of the small quantity involved. Some effects of aureomycin on the requirement for thiamine are discussed. A similar diet was fed to chicks, and the same level was adequate.R. G. Robenalt. (Biological Abstracts)

ROBERSON, ROBERT H., and **PHILIP J. SCHAIBLE.** (Michigan State U., East Lansing.)
THE AVAILABILITY TO THE CHICK OF ZINC AS THE SULFATE, OXIDE OR CARBONATE. *Poultry Sci.* 39(4): 835-837. 1960.—An experiment was conducted with chicks to determine the availability of Zn in the form of different compounds using semi-purified diets. The sulfate, oxide, and carbonate forms of Zn were equally available to the chick at 2 levels at which it was tested in the feed. The Zn in these forms produced satisfactory growth of the chick and prevented Zn deficiency symptoms.—P. J. Schaible. (Biological Abstracts)

ROBERSON, ROBERT H., and **PHILIP J. SCHAIBLE.** (Michigan State U., East Lansing.)
THE EFFECT OF ELEVATED CALCIUM AND PHOSPHORUS LEVELS ON THE ZINC REQUIREMENT OF THE CHICK. *Poultry Sci.* 39(4): 837-840. 1960.—Three experiments were conducted with chicks to determine the effect of high levels of Ca and P on the Zn reqiurement of the chick. Excess Ca depressed growth and feed efficiency and created Zn deficinecy. Addition of Zn at 80 ppm counteracted this effect of the high mineral supplement.—P. J. Schaible. (Biological Abstracts)

ROBERSON, ROBERT H., and **PHILIP J. SCHAIBLE.** (Michigan State U., East Lansing.)
THE TOLERANCE OF GROWING CHICKS FOR HIGH LEVELS OF DIFFERENT FORMS OF ZINC. *Poultry Sci.* 39(4): 893-896. 1960.—Three experiments were conducted to determine the tolerance of White Leghorn chicks to hihg levels of zinc. Levels of zinc up to 1000 parts per million as the oxide, sulfate and carbonate did not significantly influence the rate of growth of the birds, feed efficiency or livability. At 1500 ppm of zinc and above, the carbonate and sulfate of zinc adversely affected growth and feed efficiency. Mortality was not severe except at the highest level of 3000 ppm of zinc as the carbonate.—P. J. Schaible. (Biological Abstracts)

RUDOLPH W. Hahnchenmastversuch mit einem Oxytetracyclinpraparat bei verschiedenen Anteilen tierischen Eiweisses.
COCKEREL FATTENING TRIAL WITH AN OXYTETRACYCLINE PREPARATION AND DIFFERENT AMOUNTS OF ANIMAL PROTEIN. *Jahrb. Arbeitsgemeinschaft Futterungsberatung.* 1958/1959, 2, 220-224.—In a trial lasting 8 weeks, 2 groups of 40 day-old Leghorn

chickens were fed to appetite on one of 4 mashes of which animal protein, as fishmeal and meat-and-bone meal, was 8%. In 3 groups given 20 g oxytetracycline per ton feed, animal protein was 8, 5 and 2% of the ration, respectively. Average final weights were 722, 751, 719 and 731 g; the effect of antibiotic was greater in the first 5 weeks. Feed intake and efficiency of feed conversion were slightly better in all groups given oxytetracycline. Average requirment for animal protein was 261, 278, 170 and 67 g per kg gain.—J. C. Rigg (Nutrition Abstracts & Reviews)

RODOLPH, W. Untersuchungen uber den Eiweissbedarf von Mastenten. THE PROTEIN REQUIREMENT OF TABLE DUCKS. *Jahrb. Arbeitsgemeinschaft Futterungsberatung.* 1958/1959, 2, 237-239.—The protein requirement of table ducks was considered to be about 17% crude protein in a diet of cereals with soya bean oilmeal and 5% fishmeal. It produced ducks of 2.3 to 2.6 kg with cold carcase yield 63 to 64%. Males were heavier than females.—D. Duncan. (Nutrition Abstracts & Reviews)

ROSS. ERNEST. (U. Hawaii. Honolulu.)
STORAGE OF MIXED FEEDS CONTAINING CANE FINAL MOLASSES. I. EFFECT ON CHICK GROWTH AND FEED UTILIZAION. *Poultry Sci.* 39(4): 985-993. 1960.—The effective storage life of feeds containing 0, 15, and 30% cane final molasses was determined using 6 wk. body wt. and feed efficiency of New Hampshire chicks as criteria of nutrient loss. No loss in nutritive value could be detected after storage of the 0% molasses feed for 9 months. Loss in food value of the 15% molasses ration was not appreciable until after 34 wks. of storage. Nutrient loss in the 30% molasses feed was curvilinear, starting at about the 22d week of storage.—Ernest Ross. (Biological Abstracts)

ROSS. ERNEST. (U. Hawaii. Honolulu.)
THE EFFECT OF WATER RESTRICTION ON CHICKS FED DIFFERENT LEVELS OF MOLASSES. *Poultry Sci.* 39(4): 999-1002. 1960.—Restricting the water intake of New Hampshire chicks fed 0, 15, and 30% molasses to 3 1/2 hr. periods per day for 6 weeks resulted in progressively poorer growth with increasing molasses concentration. Water restriction of the 0 molasses group increased total water consumption and significantly increased fecal moisture. The water-restricted chicks receiving 15% molasses consumed slightly less water but produced significantly wetter droppings. At the 30% level, the restricted group consumed 69% as much water as its control and produced slightly drier droppings.—Ernest Ross. (Biological Abstracts)

ROSS. ERNEST, and **MARTIN SHERMAN.** (U. Hawaii, Honolulu.)
THE EFFECT OF SELECTED INSECTICIDES ON GROWTH AND EGG PRODUCTION WHEN ADMINISTERED CONTINUOUSLY IN THE FEED. *Poultry Sci.* 39(5): 1203-1211. 1960.—Phenothiazine at 6600-11,023 ppm, 0-(3-chloro-4-methylumbelliferone) O,O-diethyl phosphorothioate (Co-Ral) at 11-132 ppm, O,O-diethyl 0-(2-isopropyl-4-methyl-6-pyrimidinyl) phosphorothioate (Diazinon) at 11-220 ppm, O,O-dimethyl 2,2,2-trichloro-1-hydroxyethylphosphonate (Dipterex) at 44-132 ppm, S-1,2-bis (ethoxycarbonyl) ethyl O,O-dimethyl phosphorodithioate (malathion) at 220.1, 102 ppm. O,O-dimethyl 0-(2,4,5-trichlorophenyl) phosphorothioate (ronnel) at 22-220 ppm. and O-methyl 0(2,4,5-trichlorophenyl) Phosphoramidothioate (Dow ET-15) at 11-132 ppm. were fed to New Hampshire chicks and laying hens for a 29-week period. At the levels fed, Dow ET-15 and ronnel appeared relatively non-toxic to the birds , while Diazinon and malathion appeared to be equally toxic to both chicks and hens. Phenothiazine and Co-Ral were more toxic to chicks, while Dipterex appeared to be more toxic to the hens. Toxicity was expressed as mortality, lower egg production, poorer growth, or weight loss.—Ernest Ross. (Biological Abstracts)

SAFROV, V. A. K voprosu o normirovanii dlja pticy vitamina A.
VITAMIN A STANDARDS FOR POULTRY. *Pticevodstvo*, 1960, No. 7, 40-43.—After a discussion of some experiences on a poultry farm it is recommended that collective and state farms should supply the following sources of vitamin A per hen daily: from May to August not less than 20 g fresh green feed, from September to December up to 25 g carrots or 15 to 20 g kale, and from January to April up to 20 g good silage or 7 to 10 g pine needles or good dried grass. Chickens need less according to size, and may be given silage from 2 weeks of age.—D. Duncan. (Nutrition Abstracts & Reviews)

SCHNEIDER, D. L., A. R. DOBERENZ, A. A. KURNICK, M. C. VAVICH, and **A. R. KEMMERER.** (Depts. of Agric. Biochem. and Poul. Sci., Univ. of Arizona, Tucson.)
EFFECTS OF STERCULIA FOETIDA OIL ON YOLK WEIGHT AND WATER UPTAKE OF THE HEN EGG. *Fed. Proc.* 19(1Pt. 1): 221. 1960.—Abstract. (Biological Abstracts)

SCHULTZE, M. C. (U. Minnesota, St. Paul.)
NUTRITION. *An. Rev. Biochem.* 29: 391-412, 1960.—This review is restricted to the following topics: selenium and vitamin E; the origin of substituted benzoquinones in animal tissues; developments and trends in the nutrition of livestock and poultry; and inadvertent production of disease in animals. (Biological Abstracts)

SELL, J. L., and **S. L. BALLOUN.** (Iowa State U., Ames.)
THE EFFECTS OF METHIMAZOLE ON WEIGHT GAINS, CARCASS COMPOSITION, THYROID GLAND WEIGHT AND BLOOD COMPONENTS OF COCKERELS. *Poultry Sci.* 39(4): 930-937. Illus. 1960.—Methimazole 20 mg/lb. of ration decreased weight gain and feed efficiency; increased thyroid weight but had no effect on carcass composition of 6-week-old chickens. One milligram U2911 or 32 mg dienestrol diacetate, alone and in combination with methimazole, increased carcass fat but did not alter weight gain. The feeding of 0.075% thiouracil reduced growth rate and increased thyroid weights of 4-week-old chicks 60-fold. Methimazole, at 120 mg/lb. of ration, reduced growth rate, caused a 25-fold increase in thyroid weight and increased plasma lipids 74%. Histological examination showed that 120 mg methimazole caused less thyroid hypertrophy along with more hyperplasia in interfollicular regions than did 0.075% thiouracil.—S. L. Balloun. (Biological Abstracts)

SHERWOOD, D. H., and **T. T. MILBY.** 1961. (General Mills Inc., Indianola, Iowa.)
CONTROLLED FEEDING OF LAYING HENS. *Poultry Sci.* 40(1): 80-86.—Limited feed consumption with 4 tests on 1,700 meat-type birds and one test with 200 strain-cross Leghorns showed no consistent effect on mortality. Egg production of meat-type hens was slightly higher on medium energy than high energy when full fed. Mechanically limiting amount of feed did not improve production. In most cases economic returns favored full-feeding a medium energy feed as compared with either full or restricted feeding of high energy rations, and hatchability was slightly better on limited feed intake in 2 out of 3 comparisons. With Leghorns, limiting the feed intake lowered production with no saving in feed cost per dozen eggs. Less feed wastage is suggested as the most desirable effect of limited feeding.—From authors conclusions.

SIBBALD, I. R., J. D. SUMMERS, and **S. J. SLINGER.** (Ontario Agric. Coll., Guelph, Canada.)
FACTORS AFFECTING THE METABOLIZABLE ENERGY CONTENT OF POULTRY FEEDS. *Poultry Sci.* 39(3): 544-556. 1960.—The usefulness of metabolizable energy (M.E.) values in the formulation of poultry rations is dependent upon 2 assumptions: (1) that the

M.E. value of an ingredient is independent of the other diet components, and (2) that the value remains relatively constant irrespective of age or type of bird to which the material is fed. If either of these assumptions is invalid then there will be several M.E. values for each feed ingredient. A series of experiments conducted with growing chicks yielded the following: (1) the chronic oxide indicator method is significantly more precise than total collection, (2) the M.E. content of several feed ingredients differed significantly when fed to birds of 3 and 7 weeks of age, and (3) the M.E. content of corn varied significantly when combined with 3 different basal diets but the M.E. value for wheat did not change. Further study of the factors influencing M.E. values is necessary before a survey of M.E. content of poultry feed ingredients is undertaken.—I. R. Sibbald. (Biological Abstracts)

SPINKA, J. Porovnani ucinku vitaminu D_2 a D_3 kostnimi testy na kuratech.

RELATIVE EFFECTS OF VITAMINS D_2 AND D_3 IN A BONE TEST ON CHICKENS. *Zivocisna Vyroba*, 1960, 5, 417-426. (Biol. stan. Pokusn. stred. prazsk. pivovaru n.p. zavod, Branik.) Russian and German summaries.—Day-old chicks housed in the dark were divided into 4 groups and fed on a rachitogenic diet. After 15 days they were given by mouth 1000 I.U. crystalline vitamin D_2 or D_3 or vitamin D isolated from brewer's yeast after it had been exposed to ultraviolet light, or no vitamin. Fourteen days later half the chickens were killed and the femora were examined. The other chickens were given access to an open-air run and their growth was studied for a further 2 months.

Weight gain, length, weight and mineral content of femur, serum Ca and total minerals in blood were similar in chickens given vitamin D_3 or vitamin D isolated from yeast, both of which gave better results than vitamin D_2.—R. G. Hankin. (Nutrition Abstracts & Reviews)

SPLITTGERBER, H., and B. MOBIUS. Futtermischungen fur die Junggeflugelmast.

FEED MIXTURES FOR BROILER FATTENING. *Arch. Geflugelk.*, 1960, 24, 271-274. (Lehr- Veruchsanst. Kleintierzucht, Unna-Konigsborn.) English summary.—In a preliminary experiment, comparing 7 commercial feeds, 2.402 kg of the best was required per kg gain. It was compared with an experimental feed made up of fishmeal 60, milk powder 20, fat 30, soya meal 230, yeast 10, lucerne meal 20, maize 300, milo meal 150, wheat 100, maize gluten meal 25, seaweed meal 5, and minerals and vitamins 48 kg. Methionine, 0.2%, was added with an antibiotic supplement.

For 55 days groups of 30 day-old male Cornish × White Rock chickens were given the mixture with or without methionine, or the commercial feed. Feed intake was 1312, 1238 and 1188 g, respectively, and feed per kg weight gain was 2258, 2350 and 2408 g. The addition of methionine is economic.—J. C. Rigg. (Nutrition Abstracts & Reviews)

STEFANOVIC, L. E. Vlijanie biomicina, riboflavina i vitamina B_{12} na rost i razvitie cypljat.

EFFECT OF BIOMYCIN, RIBOFLAVIN AND VITAMIN B_{12} ON GROWTH AND DEVELOPMENT OF CHICKENS. *Fiziol. Biohim. Pitan. sel'skohoz. zivotnyh, Akad. Nauk. Latv. SS R, Riga*, 1959, 5-12.—Eight groups of chickens were reared on a basal diet without animal protein, in which the main source of protein was soya bean cake; a ninth group had part of the soya cake replaced by casein and baker's yeast. The basal diet was low in riboflavin and lacked vitamin B_{12}. For 7 groups it was supplemented with, per kg feed, 20 mg biomycin (Aureomycin) or 25 μg vitamin B_{12} or 3 mg riboflavin or combinations of these. The study covered the period from 2 to 33 days of age and the chickens were weighed every 5 days.

Weight gains improved by almost half in the group given riboflavin, providing evidence that the basal diet was lacking in that vitamin. But even without added vitamins the supplement of antibiotic increased gains

by 28%; the supplementary effect of biomycin in a diet with riboflavin was only 13%. Moreover, biomycin increased the riboflavin content of the liver. Vitamin B_{12} alone had very little effect on weight gains, but together with biomycin it was as effective as riboflavin alone. Biomycin alone or with riboflavin did not affect liver vitamin B_{12}.—D. Duncan. (Nutrition Abstracts & Reviews)

SULLIVAN, T. W. (U. Wisconsin, Madison.), **B. D. BARNETT,** and **H. R. BIRD.**

EFFECT OF ORIGIN, PROCESSING, AND STORAGE ON THE UNIDENTIFIED GROWTH FACTOR ACTIVITY OF A VARIETY OF FISH MEALS. *Poultry Sci.* 39(4): 1037-1041. 1960.—Unidentified growth factor activity was present in a wide variety of fishery by-products. The growth promoting activity of fish meal samples was not altered by storage in air at room temperature for 18 months or by excessive drying temperatures during processing. The fish factor appeared to be quite stable to ordinary conditions employed in the processing and storage of fish meals.—H. R. Bird. (Biological Abstracts)

SULLIVAN, T. W. 1960. (Dept. Poultry Husb., U. Nebraska, Lincolin 3.)

AN ESTIMATE OF THE PHOSPHORUS REQUIREMENT OF BROAD BREASTED BRONZE TURKEYS, 8-20 WEEKS OF AGE. *Poultry Sci.* 39: 1321-1327.—Three experiments were conducted to determine the phosphorous requirement of Broad Breasted Bronze turkeys, 8-20 weeks of age. Results obtained suggest or indicate the following: (1) When the diets contain 1.55 percent of calcium, female and male turkey poults require .4 to .5 percent of readily available phosphorus, or .75 and .85 percent of total phosphorus, respectively, for maximum growth and bone ash deposition. (2) The intake of calcium and phosphorus by the birds during early growth will have a definite effect on the phosphorus requirement for later growth. (3) In turkeys, 17 to 20 weeks of age, the bones of females are significantly ($p.< .01$) highr in ash content than are the bones of the males. (4) Turkeys, 8-20 weeks of age, apparently do not utilize the phytin phosphorus in feedstuffs of plant origin to any great extent.—Authors summary.

SUMMERS, J. D., S. J. SLINGER, I. MOTZOK, and **G. C. ASHTON.** (Ont. Agric. Coll., Guelph, Canada.)

INTERRELATIONSHIPS BETWEEN PHOSPHORUS FLUORIDE AND FAT IN CHICK DIETS. *Poultry Sci.* 39(3): 664-671. 1960.—F from NaF caused a growth depression in chicks fed diets containing 6% added fat while in the absence of added fat the results were variable. The effect of F^- in depressing chick weight appeared to be due to a reduction in feed intake and not to interference with feed utilization. F decreased percentage bone ash at low levels of P and increased bone ash at adequate levels of P; the interaction between F^- and P was satistically significant. In one experiment there was a significant interaction between dietary fat and level of P for bone formation. It is possible that the above interactions could be sources of error in the parallel-line assay technique for estimating P availability in feed phosphate supplements. Evidence is presented to indicate that the F^- in soft phosphate is relatively unavailable to the chick.—Authors summary. (Biological Abstracts)

SUPPLEE, WILLIAM C. (U. Maryland, College Park.), and **G. F. COMBS.**

THE EFFECT OF A DIETARY ANTIBIOTIC ON THE REQUIREMENT OF THE TURKEY POULT FOR POTASSIUM. *Poultry Sci.* 39(5): 1211-1213. 1960.—Growth of turkey poults to 2 weeks of age was compared using a soy-bean protein-sucrose-corn oil diet with 0.35% to 0.6% K, with and without an added antibiotic. With the antibiotic present growth was not further improved above 0.45% K. Without the antibiotic growth increased progressively as K was increased to 0.6%. The general growth level was much superior with antibiotic diets.—G. F. Combs. (Biological Abstracts)

SUPPLEE, W. C., R. D. CREEK, G. F. COMBS, and **D. L. BLAMBERG.** 1961. (Dept. Poul. Husb., U. Maryland, College Park, Md.)
THE ZINC REQUIREMENT OF POULTS RECEIVING PRACTICAL DIETS. *Poultry Sci.* 40(1) 171-176.—Five studies were conducted to determine the need for supplementary zinc in practical turkey rations. In all trials the weight of poults receiving supplementary zinc exceeded that obtained with unsupplemented rations. Extensive feather abnormally and a significant amount of transitory hock disorder were observed in a 4-week trial with a corn-soy ration containing 42 ppm. adventitious zinc. Only a minor incidence of either abnormality was found when the ration was supplemented with 50 ppm. zinc. In a 3-week trial with a corn-soy ration containing 33 to 63 ppm. zinc growth plateaued at 51 ppm. Feather abnormality was lowered from 100% incidence with the 33 ppm. ration to 30% with the 63 ppm. ration. Some hock deformity was detected at all zinc levels with the greatest incidence at the lowest zinc level.—Authors summary.

SUSAKI, SHINJI, and **H. HAMAKAWA.**
FEEDING EXPERIMENT OF SWEET POTATO ON MALE CHICKS. (In Japanese with English summ.) *Bull. Fac. Agric. Univ. Miyazaki.* 4(2): 236-243. 1959.—While examining the rice hull as a remedy for deficiencies of the sweet potato the authors also repeated the experiments conducted by M. Yoshida and H. Morimoto (1957) which were reported under the title "Nutritive value of sweet potato as a carbohydrate source for poultry feed." Feeding experiments were carried out over a nine-week period, using the following lots of food: A) Standard feed; B) feed containing 50% sun-dried sweet potato; C) feed containing 50% sun-dried potato and 5% rice hulls. The following observations were made: The sun-dried sweet potato lowered the growth rate of young chicks. The rice-hulls did not remedy the deficiency of sweet potato. The deficiency of sweet potato as a starting food can be expected to lessen as the chicks grow. The authors did not find sweet potato as detrimental to chick growth, as did Yoshida and Morimoto. (Biological Abstracts)

TANGL, H. A takarmany zsirtartalmanak befolyasa a terramicin sulygyarapito hatasara.
EFFECT OF THE FAT CONTENT OF THE FEED ON THE VALUE OF TERRAMYCIN IN INCREASING WEIGHT. *Kiserletugyi Kozlemenyek,* 1959, 52B, No. 1/2, 203-210. (Allattenyesztesi Kutatoint. Budapest.) Russian and German summaries.—For 50 days 4 groups of 150 day-old Hampshire chicks were given a control diet, with for experimental groups 4% added fat, terramycin, or both. Weight gains were greatest when terramycin only was given, least in controls and intermediate with fat or fat and antibiotic. (From tables and German summary.) —J. C. Riggs. (Nutrition Abstracts & Reviews)

THOMPSON, C. R., K. W. TAYLOR, and **G. O. KOHLER.** 1961. (West Reg. Res. Lab., Albany 10, Calif.)
EFFECT OF DIFFERENT DRYING CONDITIONS ON SUGAR BEET ROOTS AS A CARBOHYDRATE SOURCE FOR BROILERS. *Poultry Sci.* 40(1): 128-133.—Sugar beet cossettes were dried under several conditions and incorporated in various chick diets. When dried quickly at high temperature, they were used successfully to replace much of the carbohydrate in diets of rapidly growing chicks. Reduced gains were sometimes observed when beets dried at low temperatures were used. Similar gain reduction occurred when beets completely replaced corn. Beets also contain something which produces an increase in volume of droppings even though moisture content is not affected.—Authors summary.

THORNTON, P. A. (Colorado State U., Agric. Expt. Sta., Ft. Collins.)
THE INFLUENCE OF DIETARY PROTEIN LEVEL ON THE RESPONSE OF S. C. WHITE LEGHORNS TO SUPPLEMENTARY

ASCORBIC ACID. *Poultry Sci.* 39(5): 1072-1076. 1960.—The protein level of the hen's diet appeared to influence the response of Single Comb White Leghorns to supplementary vitamin C. In 3 separate studies it was observed that hens under increased environmental temperatures were able to maintain eggs shell thickness or improve this factor when vitamin C was added to a 13% protein diet. Similar observations made concurrently on birds given a 17% protein diet indicated either no response or detrimental results. These observations suggested that the amino acid balance may have had some influence. Calculation of the phenylalamine and tyrosine levels showed that the percent of the latter amino acid to total protein was less in the higher protein diet. The possibility that tyrosine influences ascorbic acid activity in shell thickness maintenance is currently being investigated.—P. A. Thornton. (Biological Abstracts)

THORNTON, PAUL A. (Colorado Agric. Expt. Sta., Fort Collins.) THIAMINE REQUIREMENT OF GROWING CHICKS AS INFLUENCED BY BREED DIFFERENCES. *Poultry Sci.* 39(2): 440-444. 1960.—The thiamine requirement for early growth and prevention of polyneuritis was determined in the heavy breed chick (New Hampshire × Delaware) and the light breed chick (Single Comb White Leghorn). A semipurified diet deficient in thiamine and predominantly carbohydrate in nature was employed as the basal ration. Additions of thiamine hydrochloride included 0.0, 0.1, 0.2, 0.3 and 0.4 mg per pound of the deficient diet. The Leghorn breed was more affected by the thiamine deficiency as indicated by growth, per cent mortality and polyneuritic incidence. A level of 0.2 mg per pound of diet of thiamine hydrochloride was required for normal growth of the heavy breed chicks while 0.4 mg was needed in the Single Comb White Leghorns. The evidence of this experiment indicated that the requirement for thiamine for early growth was higher in the Leghorn than in the heavy breed chick.—P. A. Thornton. (Biological Abstracts)

THORNTON, P. A., and J. V. SHUTZE. (Colorado State U., Fort Colilns.) THE INFLUENCE OF DIETARY ENERGY LEVEL, ENERGY SOURCE AND BREED ON THE THIAMINE REQUIREMENT OF CHICKS. *Poultry Sci.* 39(1): 192-199. 1960.—Increasing the dietary energy level by addition of sucrose to the ration apparently intensified the need for thiamine in the chick. A similar energy increase from corn oil appeared to reduce the need for this vitamin. The Leghorn breed appeared to have a higher thiamine requirement than a New Hampshire X Delaware cross chick. This statement is based on the shorter survival time and increased mortality which occurred in Leghorn chicks when placed on thiamine deficient diets and compared to the heavier breed chick treated similarly. A level of 0.4 mg of supplemental thiamine hydrochloride appeared to meet the requirements for this vitamin under all conditions of this particular experimental design.—P. A. Thornton. (Biological Abstracts)

THORNTON, PAUL A., and WILLARD A. WHITTET. (Agric. Expt. Sta., Fort Collins, Colorado.) PROTEIN REQUIREMENT FOR EGG PRODUCTION AS INFLUENCED BY MANAGEMENT, GENETIC BACKGROUND AND DIETARY ENERGY LEVEL. *Poultry Sci.* 39(4): 916-921. 1960. —Four levels of dietary protein (17, 15, 13 and 11%) were tested over 2 production years to measure the protein requirement for egg production. Within the experimental design the effect of genetic background for each protein level was tested with 4 different high egg producing strains. Other studies included the comparison of floor and cage management conditions and the influence of dietary energy level on protein requirements. Observations in all experiments included egg production, feed efficiency and percent mortality. The data for the entire experiment indicated that the 17, 15, and 13% protein levels were comparable for each observation. The groups fed the 11% protein diet had a marked

reduction in egg production in all cases with 1 exception. When a low energy diet was fed, the 11% group was comparable to the 3 higher protein levels. Results of this experiment indicated that a 13% protein level was comparable to either a 15 or 17% diet for egg production.—P. A. Thornton. (Biological Abstracts)

TOWER, B. A., E. C. BURNS, H. C. AUSTIN, and **F. L. BONNER.** (Louisiana State U., Agric. Expt. Sta., Baton Rouge.)

THE PERFORMANCE OF CAGED LAYERS FED VARYING PERCENTAGES OF BORAX (POLYBOR 3) IN THE RATION. *Poultry Sci.* 39(5): 1190-1193. 1960.—Polybor 3 (disodium octoborate tetrahydrate $Na_2B_8O_{13}.4H_2O$) was fed to caged hybrid Leghorns for 147 days at 0.00, 0.05, 0.10, 0.20, 0.30 and 0.50% of the ration. Although there were some differences in production between treatments an analysis of variance of this data failed to show significant differences. This was due, perhaps, to the small numbers involved. Significant difference in egg weights and body weight changes were apparent within the 2 high level polybor 3 groups.—B. A. Tower. (Biological Abstracts)

TSANG, SIMON T. L. (Ultra-Life Labs., Inc., East St. Louis, Ill.), and **PHILIP J. SCHAIBLE.**

THE VALUE OF CORN FERMENTATION SOLUBLES IN POULTRY NUTRITION. *Poultry Sci. 39(2):* 251-257. 1960.—Three experiments were carried out to determine the value of corn fermentation solubles (fermented corn extractives) product in practical broiler rations. This product supplied unidentified growth factor(s) required by chicks for rapid growth and provided utilizable protein and energy. Under the experimental conditions of equalized protein and energy, it replaced equivalent amounts of menhaden fish meal in corn-and soybean-oil-meal type rations with respect to unidentified growth factors. It exerted its greatest effect in stimulating growth of chicks in diets containing over a thousand Calories of productive energy per pound of feed.—P. J. Schaible. (Biological Abstracts)

VALDMAN, A. R., and **A. E. FELDMAN.** Vzaimootnosenija mezdu antimikrobnymi vescestvami i vitaminami v pitanii cypljat.

INTERRELATIONS BETWEEN ANTIMICROBIAL SUBSTANCES AND VITAMINS IN CHICKEN NUTRITION. *Fiziol. Biohim. sel'skohoz. zivotnyh, Akad. Nauk Latv. SS R, Riga,* 19-41.—Three sets of experiments are described in which the effects of a number of antibiotics were studied on the basis of several chick diets, some of them with insufficient amounts of riboflavin or vitamin B_{12}. It is concluded that biomycin (Aureomycin) or penicillin stimulates early synthesis of riboflavin in the digestive tract and thus increases the value of diets low in that vitamin. Antibiotics do not stimulate production of vitamin B_{12}, and are most effective in presence of it. Riboflavin or biomycin increased storage of a supplement of vitamin B_{12} in the liver and both together were much more effective, but neither increased liver vitamin B_{12} when the diet lacked the vitamin.—D. Duncan. (Nutrition Abstracts & Reviews)

VOHRA, PRAN, B. W. LANGER, Jr., and **F. H. KRATZER.** (U. California Davis.)

METHYL ACCEPTORS FOR BIOSYNTHESIS OF CHOLINE. *Poultry Sci.* 39(3): 626-630. 1960.—Aminoethanol, formaldehyde-reacted aminoethanol, and hydroxymethylserine failed to improve perotic condition of poults fed choline deficient diets. Monomethylaminoethanol replaced choline for prevention of perosis but was less growth promoting than choline or dimethylaminoethtanol, both of which have some antiperotic and growth promoting activity.—Pran Vohra. (Biological Abstracts)

WAIBEL, P. E., R. E. BURGER, R. A. BALL, J. H. SAUTTER, I. E. LIENER, and **B. S. POMEROY.** (U. Minnesota, St. Paul.)

EFFECT OF TRIPARANOL ON BETA-AMINOPROPIONITRILE-

INDUCED DISSECTING ANEURYSM AND BLOOD LIPID LEVELS IN THE TURKEY. *(Proc. Soc. Exptl. Biol. and Med.* 104 (4): 673-676 1960.—Addition of 25-1600 ppm triparanol to the diet of turkey poults lowered the ratio of plasma cholesterol to phospholipid. Incidence of beta-aminopropionitrile—indeed disecting aneurysms was not lessened by triparanol. Degree of growth depression due to triparanol was proportional to logarithm of dose.—Authors. (Biological Abstracts)

WAIBEL, P. E., ELTON L. JOHNSON, and **J. W. HASSING.** (U. Minnesota, St. Paul.)

COMPARISON OF VARIOUS DIETARY ANTIBIOTICS FOR TURKEY POULTS. *Poultry Sci.* 39(3): 611-613. 1960.—Growth of turkey poults was improved by erythromycin thiocyanate, SPS (a mixture containing 5/12 streptomycin sulfate, 2/12 procaine penicillin, and 5/12 sulfaquinoxaline) chlortetracycline, HCl, and oleandomycin. Comparative responses were examined, especially those produced by "older" vs. "newer" antibiotics.—P. E. Waibel. (Biological Abstracts)

WAIBEL, P. E., L. JOHNSON, and **A. M. PILKEY.** 1961. (Dept. Poul. Husb., U. Minn., St. Paul, and N. E. Exp. Sta., U. Minn., Crookston.)

SUCCESSFUL TURKEY GROWTH WITH REDUCED CALCIUM AND PHOSPHORUS LEVELS. *Poultry Sci.* 40(1): 256-258.

WALKER, JAMES B. (Baylor U. Coll. Med., Houston, Texas.)

METABOLIC CONTROL OF CREATINE BIOSYNTHESIS. I. EFFECT OF DIETARY CREATINE. *Jour. Biol. Chem.* 235(8): 2357-2361. 1960.—Feeding chicks a complete diet containing 2% creatine for 3 days lowers the activity of chick liver arginine-glycine transamidinase to 8% of the control value. When creatine is removed from the diet of creatine-fed chicks, transamidinase activity is readily restored. No toxic effect of dietary creatine has been noted in long term feeding experiments. Dietary creatinine, in contrast to creatine, has no significant effect on the liver transamidinase level. Enzyme repression by dietary creatine appears to be specific for transamidinase; the levels of guanidinoacetate methylgerase and arginase in chick liver remain unchanged after creatine feeding. The activities of transamidinase and methylferase are not inhibited by creatine, creatinine, or phosphorylcreatine, as measured by assays in vitro. The possibility that these phenomena reflect the operation of a homeostatic, negative feedback mechanism for the control of creatine biosynthesis is discussed.—J. B. Walker. (Biological Abstracts)

WEHUNT, K. E. (U. Georgia, Athens.), H. L. FULLER, and **H. M. EDWARDS, Jr.**

THE NUTRITIONAL VALUE OF HYDROLYZED POULTRY MANURE FOR BROILER CHICKENS. *Poultry Sci.* 39(4): 1057-1063. 1960.—Four chick feeding trials were conducted to study the nutritional value of hydrolyzed broiler litter and autoclaved hen and broiler manures as sources of protein and unidentified growth factors for chicks. Based on chemical analysis it was shown that about one-half of the crude protein of the hen manure and one-third of that of the broiler manure used in the protein study exists as true protein. When used to supplement diets which were sub-optimal in protein the crude protein of the manures was utilized somewhat less efficiently than that of soybean oil meal or a mixture of casein and gelatin; but on the basis of true protein, the g protein/g gain was approximately equal in all supplements. The autoclaved manures appeared to be nearly equal to a combination of fish solubles and dried distillers' solubles and superior to either alone in supplementing corn-soybean oil meal type rations containing no other recognized source of unidentified growth factors.—H. L. Fuller. (Biological Abstracts)

WHARTON, F. D., Jr., J. C. FRITZ, and **L. J. CLASSEN.** (Dawe's Labs., Inc., Chicago, Ill.)

CHICK DIET STUDIES 1. DISCRIMINATION BETWEEN DIETS OF DIFFERING NUTRITIONAL VALUE. *Poultry Sci.* 39(4): 1018-1023. 1960.—Four experiments were conducted in batteries to determine if broiler strain chicks could distinguish between an adequate diet and one that was deficient in a single vitamin. The simplified complete diet was designed to be nutritionally complete according to present standards. The deficient diet was produced by omitting thiamine, choline, or vitamin D from the formula. Feeders containing the 2 diets were rotated daily to eliminate bias. Data were recorded on proportion of each feed consumed and the chicks' performance. The chicks did not instinctively select the complete diet, although there was some evidence of improvement after a learning period of 2 or 3 weeks. Preliminary feeding with either a complete or deficient diet for the first one or two weeks, followed by a choice during the remainder of the 4 week test period, had no effect on diet selection.—J. C. Fritz. (Biological Abstracts)

WILCOX, ROBERT ALVIN.

UNIDENTIFIED GROWTH FACTORS IN SOYBEAN OIL MEAL. *Dissertation Absts.* 21(2): 284. 1960.—Abstract. (Biological Abstracts)

WILCOX, R. A., C. W. CARLSON, W. KOHLMEYER, and G. F. GASTLER. 1961. (Depts. Poul. Husb. and Sta. Biochem., S. D. Agr. Exp. Sta., Brookings, S. D.)

EVIDENCE FOR A WATER-SOLUBLE GROWTH PROMOTING FACTOR(S) IN SOYBEAN OIL MEAL. *Poultry Sci.* 40(1): 94-102.—Water extraction of soybean oil meal removed material which increased growth rate of poults receiving an isolated soybean protein diet. The increased growth appeared to be due to both organic and inorganic components. The active material was not extracted from soybean oil meal by 100 percent acetone or 100 percent ethanol. Thiotic acid did not affect growth rates under the conditions of these experiments. A possible interaction of the water extract and corn oil was indicated.—Authors summary.

WISMAN, E. L. (Virginia Agric. Exptl. Sta., Blacksburg.)

CHICK GROWTH RESPONSE TO FISH BY-PRODUCTS AND ARSANILIC ACID. *Poultry Sci.* 39(5): 1140-1148. 1960.—Dietary arsanilic acid stimulated chick growth but only when fish meal or condensed fish solubles was included in the all-vegetable basal ration. No antibiotic or other growth-stimulating additives was present in the basal ration. The fish by-products added to the basal alone improved the growth rate. Results indicated that the response to arsanilic acid depended upon some factor other than protein quality supplied by fish. —E. L. Wisman. (Biological Abstracts)

WOOD, J. D.

DIETARY MARINE FISH OILS AND CHOLESTEROL METABOLISM. 2. THE EFFECT OF VITAMIN A AND LINGCOD LIVER OIL COMPONENTS ON THE SERUM CHOLESTEROL LEVELS IN CHICKS. *Canadian Jour. Biochem. and Physiol.* 38(8): 879-887. 1960.—Lingcod liver oil unsaponifiable material was separated into three main fractions by means of an aluminum oxide column. Major components of the three fractions were vitamin A. cholesterol, and glyceryl ethers, respectively. These fractions were given as dietary supplements to cholesterol-fed chicks and the effect of the supplements on the hypercholesterolemia induced by the cholesterol feeding was investigated. The fraction containing vitamin A prevented the hypercholesterolemia. Crystalline vitamin A acetate produced a similar effect when it was added as a dietary supplement. It was concluded that vitamin A was probably the hypocholesterolemic agent in lingcod liver oil although other compounds in the oil may also exert some influence on the control of the serum cholesterol concentrations in the chicks.—Author. (Biological Abstracts)

WOOD, G. M., and R. T. SMITH. (Vermont Agric. Expt. Sta., Burlington.)
A COMPARISON OF DEHYDRATED BIRDSFOOT TREFOIL AND ALFALFA MEALS AS CONSTITUENTS OF A POULTRY MASH. *Agron. Jour.* 52(9): 501-503. Illus. 1960.—Dehydrated birdsfoot trefoil (Lotus corniculatus) meal did not surpress the growth of chicks when included at a low level (3.1%) in a broiler-starter mash whereas alfalfa *(Medicago sativa)* at the same level did. A greater proportional growth surpression was obtained at a higher level (6.2%) for the birdsfoot trefoil than for the alfalfa. Analytical assays of the 2 meals are presented indicating birdsfoot trefoil to be richer in carotene and possibly minor elements. Total saponin content of the trefoil was also higher but appeared to be biologically less active than in the alfalfa. Other unknown growth surpressing factors seemed to be operative in trefoil when fed at the higher level. Exprimental evidence is presented indicating birdsfoot trefoil may be substituted for alfalfa meal in broiler-starter rations when included at low levels of approximately 3% or less.—G. M. Wood. (Biological Abstracts)

YATES, JEROME D., and E. L. STEPHENSON. (U. Arkansas, Fayetteville.)
A STUDY OF CERTAIN ORGANIC ACIDS AS POTENTIATORS OF ANTIBIOTICS. *Poultry Sci.* 39(4): 994-999. 1960.—Terephthalic acid and several compounds structurally related to it were studied relative to their effect upon growth when fed with and without different antibiotics. No consistent effect on growth or efficiency of feed utilization was noted. When the relationship of terephthalic acid and Ca was studied, terephthalic acid was found to increase blood Ca levels.—E. L. Stephenson. (Biological Abstracts)

YOSHIDA, M., H. HOSHII, and H. MORIMOTO.
NUTRITIVE VALUE OF SWEET POTATO AS A CARBOHYDRATE SOURCE FOR POULTRY FEED. III. EFFECT OF VITAMIN A SUPPLEMENTATION ON CHICK GROWTH. (In Japanese with English summ.) *Bull. Natl. Inst. Agric. Sci. Ser. G* 19. 133-142. 1960.—Sweet potato as a carbohydrate source in chick diet is much inferior in nutritive value to corn. The effort is focussed upon experiments to find out which vitamin in the mixture is really effective. Ten to 20 day-old White Leghorn male chicks were reared in electrically heated battery for 4 weeks. Feed and water were given ad libitum. Weight gain and mortality for 4 weeks were recorded and digestibility of carbohydrate in the diets was estimated by the procedure mentioned previously. Diets of similar composition to those in the previous paper were fed to chicks in a series of 5 experiments. In series 1, 2 and 3, SP 50 diet was supplemented with various vitamins and vitamin mixtures. In series 1, the vitamin mixture was separated into 3 groups, BG, LG and AD. AD was effective, so in series 2 vitamin A and D were compared separately. Effect of various dosage of vitamin A palmitate in SP 50 diet was studied in series 3. Effect of intramuscular injection of vitamin A palmitate was compared in series 4 with that of vitamin A given orally. Effect of carotene in the so-called "carotene potato" was also studied. Since it was found previously that heat treatment of sweet potato is partly effective in increasing nutritive value of sweet potato, interrelation between vitamin A supplementation and heat treatment of sweet potato was studied in series 5. Sweet potato was steamed at 100°C for 1 hour, dried and fed in place of raw sweet potato of SP 50 diet. The data indicates clearly that vitamin A is the only effective vitamin for increasing growth rate and decreasing mortality of chicks. Addition of 2500 I. U. of vitamin A per kg diet was sufficient to produce favorable results. Intramuscular injection of vitamin A was as effective as oral supplementation of vitamin A. However, growth rate of chicks fed SP 50 diet supplemented with vitamin A was only 76% of that of chicks fed corn diet. Vitamin A did not improve feed efficiency and digestibility of carbohydrate. These results indicate that vitamin A deficiency in SP 50 diet is certainly one of the reasons why the nutritive value of sweet

potato is inferior to that of corn. Carotene in sweet potato was as effective as vitamin A but availability of carotene by chicks seemed to be much less since carotene supplemented at the level of 5000 I. U. per kg of SP 50 diet had little effect. Availability of carotene in sweet potato was not improved by heat treatment as it was in carrots. Heat treatment and vitamin A supplementation showed the same effect in increasing growth rate. Statistical analysis of data shows that heat treatment and vitamin A supplementation work independently and additively. Heat treatment improved digestibility of carbohydrate of sweet potato while vitamin A supplementation did not. There may be 2 or more factors which make the nutritive value of sweet potato lower than that of corn. —Authors. (Biological Abstracts)

ZHAN, C. L.

EFFECT OF SWEET POTATO AND CALADIUM IN FATTENING DUCKS. *Chinese Jour. Animal Husbandry* 4: 243-247. 1958.—An experiment has been made on substitutes for cereal feeds. Five groups of ducks, 50 each, chosen by similar age, weight, build, health condition and fatness, are fed with different kinds of feed. 1st group with boiled potato; 2d with raw potato in the form of strips, 3d with dried raw potato strips; 4th with boiled caladium and 5th as control, fed with mixed staple feeds consisting of 40% barley, 15% soybean cake, 20% wheat bran and 25% mixed rice bran. Boiled potato and caladium are media and cut into small pieces, while dried potato and staple feeds are soaked in water before use. The 1st to 4th group are fed 4 times, while 5th are fed thrice daily. The results of feeding thru 10 days are given. Ducks fed with boiled caladium increase most in weight. Those with dried raw potato give the least output, possibly owing to destruction of starch. Boiled caladium gives best effect because it contains considerable amount of starch, and also more dry substance than does sweet potato. Staple feed for control group contains 25% of 2-8 mixed rice bran, which is testified to be hardly digestible.—Courtesy Science Abstracts of China. (Biological Abstracts)

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The Ministry of Agriculture and Fisheries, 3 Whitehall Place, London S.W.1

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Landwirtschaftskammer Westfalen und Lippe Abtl. Tierzucht, Postfach 342, Münster (Westfalen)

Ministerium für Ernährung, Landwirtschaft und Forsten, Rossstrasse 135, Düsseldorf

INDIA

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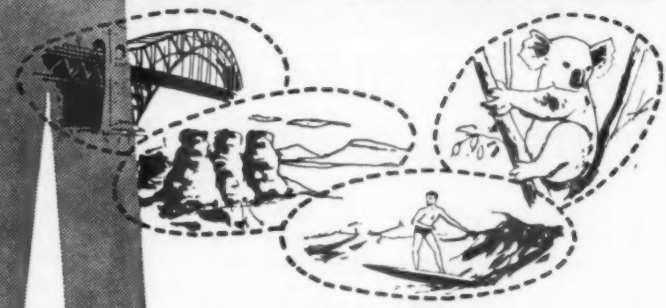

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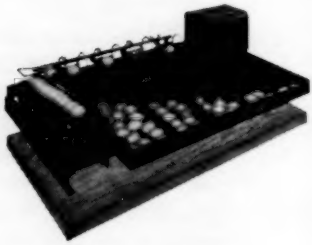

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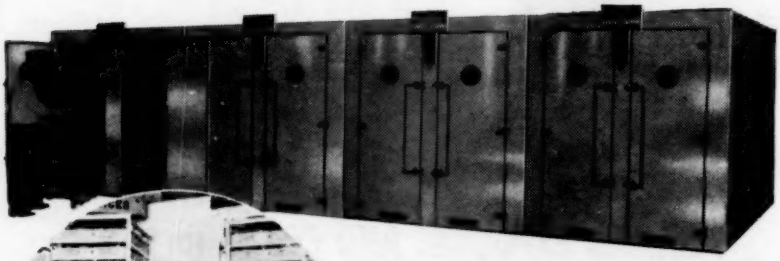

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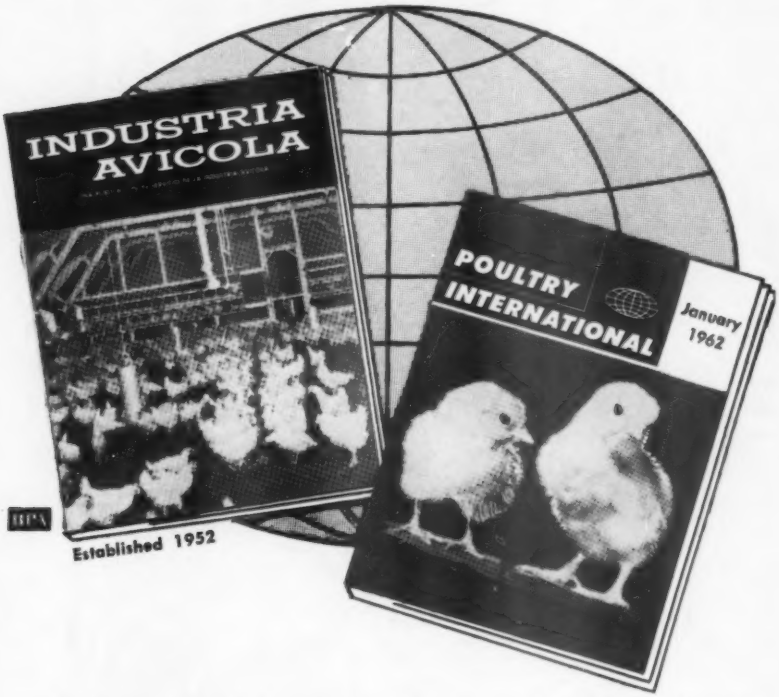

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